Pit and Quarry

With which is consolidated

CEMENT-MILL & QUARRY

January, 1935

NRA U.S. CODE GRAPHIC ARTS INDUSTRY 1934

TECHNICOAL

PROCITE TREATED

lowers coal consumption

✓ 1 Less coal per barrel.
2 Lower grinding costs.
3 Greater tensile strength.
4 Better cement color.
5 Uniform operating conditions.
6 Uniform cement clinkers.
7 Shortened burning zone.
8 Lowered sulphur content.
9 Reduced kiln ring formation.
✓ 10 Maximum kiln operation.

POWHATAN COAL
also
Procite Treated

Write for complete booklet on this modern fuel.

• Actual tests show Technicoal is saving 11 to 16 pounds of coal per barrel of clinker. Its high efficiency permits kiln operation at maximum capacity. Investigate Technicoal for better, stronger, more uniform cement at considerable savings.

TECHNICOAL SALES CORPORATION

Exclusive Sales Agents

1010 EUCLID AVENUE • CLEVELAND, OHIO

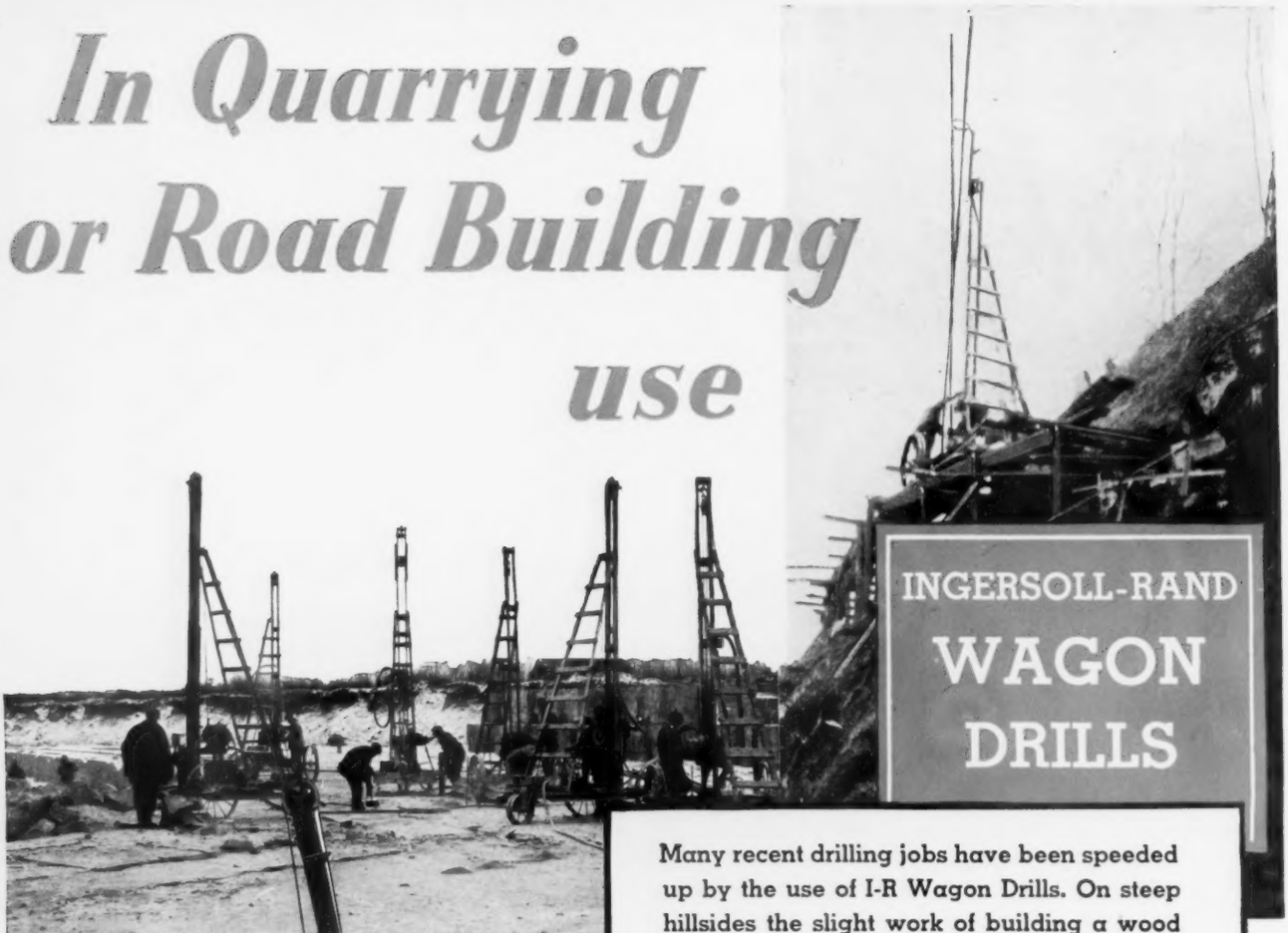
THIS IS NUMBER TWO OF A SERIES OF TECHNICOAL ADVERTISEMENTS

Pages 33-37

Since 1929 the largest net paid A. B. C. producer circulation in the field

TN1
.P65

In Quarrying or Road Building use



INGERSOLL-RAND WAGON DRILLS

Many recent drilling jobs have been speeded up by the use of I-R Wagon Drills. On steep hillsides the slight work of building a wood runway is more than compensated for by the extra rock broken per man-shift.

With these mountings, powerful I-R drifter drills can work to their fullest advantage. The operator has complete control every instant. He can drill holes up to 40 feet in depth with ease, often with steel changes up to 10 feet.

The new I-R Wagon Drills have a forward-or-backward tilting tower, making it unnecessary to level the mounting when drilling vertical holes on sloping ground or quarry floor. Set-up time is reduced. Holes can be carried under a quarry face so that no floor space is lost.

Ask the nearest I-R branch office for complete information.

111-5

Ingersoll-Rand

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Branches and agents in many cities the world over

You can't SEE the REAL DUST PROBLEM

PARTICLES so small as to be invisible, measuring perhaps 10 microns (a micron is .00003937 inches) constitute a real dust problem. These cause numerous respiratory diseases, a matter which should cause any operator of any plant where dust exists in any form—to do some serious thinking.

Ordinary dust removal systems may be satisfactory in carrying off the larger visible particles from your operations, but this is not dust collection in an engineering sense nor will it reduce your liability.

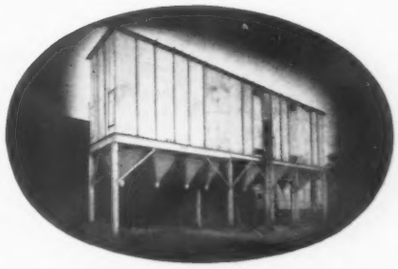
The cloth filter type of dust collection system, the best example of which is the BLAW-KNOX FRAMED BAG DUST COLLECTOR, is the only final way to "lick" the dust problem—insure against industrial disease—satisfy legal requirements (many states have them) and keep down maintenance expense.

If you have any dust in any operation in your plant, write Blaw-Knox today.

BLAW-KNOX COMPANY

2080 FARMERS BANK BUILDING PITTSBURGH, PA.

Offices and Representatives in Principal Cities



Blaw-Knox Framed Bag Dust Collectors. Muskegon Piston Ring Co., Muskegon, Mich.

Blaw-Knox Framed Bag Dust Collectors set in tandem. Perfect Circle Co., Hagerstown, Ind.

BLAW-KNOX

STEEL FRAMED BAG DUST COLLECTORS

MAY 25 1935

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Pit and Quarry

With which is consolidated
CEMENT-MILL & QUARRY

Volume 27 | January, 1935 | Number 7

MEMBER AUDIT BUREAU OF CIRCULATIONS

Published on the first of each month for producers and manufacturers of Cement, Crushed Stone, Gypsum, Lime, Sand, Gravel and other non-metallic minerals. Entered as second-class matter November 28, 1932, at the Postoffice at Chicago, Ill., under the Act of March 3, 1897.
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In This Issue

News 33

Editorials 38

Survey Reveals 1930-1935 Period Was One of Advance in Cement Field 40

What Makers of Lime Have Accomplished in the Half-Decade Just Ended 51

Tracing Five Years of Plant Progress in the Crushed-Stone Industry 56

Sand-and-Gravel Industry Takes Lead in Number of New Plants Erected 67

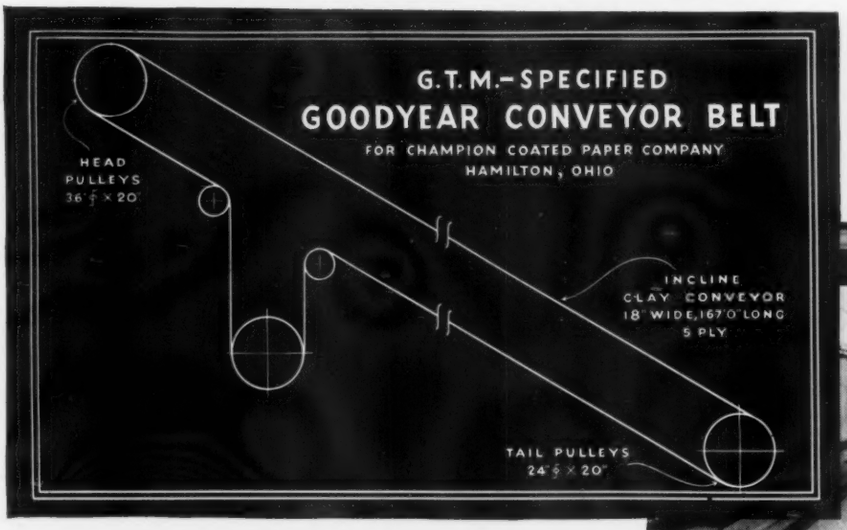
Ready-Mixed Concrete Makes Big Gains Since Early Days of Industry 75

Slag, Silica and Other Plants Install Equipment to Meet Modern Demand 79

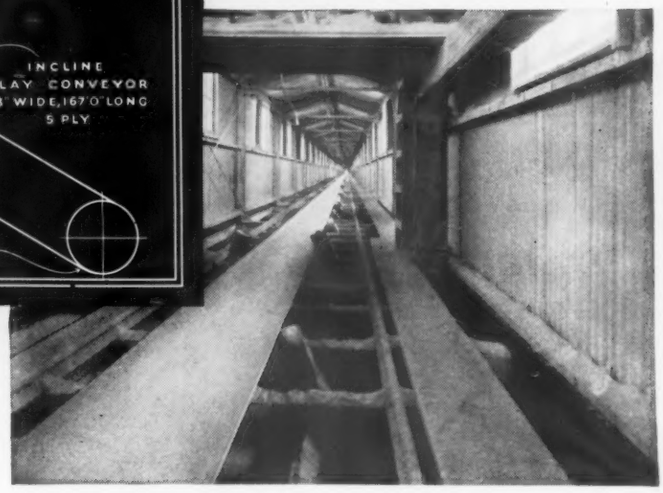
Men of the Industry 85
Personals 86
Manufacturers' Publications 87
New Corporations 87
Coming Events 87
New Machinery and Supplies 88

NRA U.S. CODE GRAPHIC ARTS INDUSTRY 1934

THE CHAMPIONS OF CHAMPION


G.T.M.–SPECIFIED
GOODYEAR CONVEYOR BELT
FOR CHAMPION COATED PAPER COMPANY
HAMILTON, OHIO
HEAD PULLEYS 36" × 20"
INCLINE CLAY CONVEYOR 18" WIDE, 167'0" LONG 5 PLY
TAIL PULLEYS 24" × 20"

Goodyear Conveyor Belts set record in world's largest coated paper mill



Installed 1920—and still on the job

14 years' service proves value of GTM Specification

IN THE great modern plant of The Champion Coated Paper Company at Hamilton, Ohio, three veteran conveyor belts have quietly proved themselves champions by every test of belt performance.

Back in 1920 the G. T. M. — Goodyear Technical Man—was called to Hamilton and consulted about belts for the conveying system handling the fine clay used in giving Champion papers satin-smoothness.

Carefully considering all factors the G. T. M. recommended a 5-ply Goodyear Conveyor Belt, 18" wide by 167' long, for the incline conveyor. Another 1372' long for the distributing conveyor, and a third, 14" wide by 1440' long, 4-ply, for the reclaiming conveyor. These belts were built to specification and installed in late 1920 and early 1921.

Today, after rolling on their appointed rounds, day after day, month after month, for some 14 years—after moving nearly seven hundred million pounds of clay — these three belts, while somewhat worn to be sure, are still good for another year of stalwart service.

That's the kind of trouble-free, low-cost, uninterrupted performance you want from belts—and that's what you get when you have belts accurately specified to your operation by the G. T. M., as records in scores of industries prove.

Why not see what this competent expert could do for you. To bring him, write Goodyear, Akron, Ohio, or Los Angeles, California — or call the nearest Goodyear Mechanical Goods Distributor.

BELTS • MOLDED GOODS
HOSE • PACKING
MADE BY THE MAKERS OF GOODYEAR TIRES

THE GREATEST NAME IN RUBBER

NRA CODE

GOODYEAR

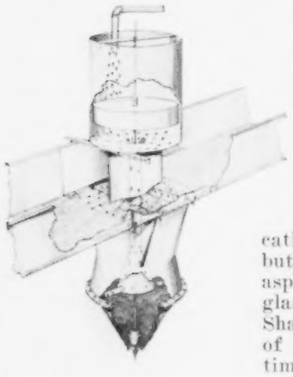
LINK-BELT

DEVOTED TO BETTER METHODS OF HANDLING

PUBLISHED BY LINK-BELT COMPANY, CHICAGO, PHILADELPHIA,

Panoramic view of McGrath Sand & Gravel Co.'s newest plant at Chillicothe, Illinois, equipped with Link-Belt digging elevators, belt conveyors, inclined conical screens, vibrating screens and Shaw classifiers. Since 1912 Link-Belt has designed, built and equipped 10 complete plants for this progressive producer, at Mackinaw, Chillicothe, Pekin, and Forreston, Illinois.

"A New Set of Sand Values



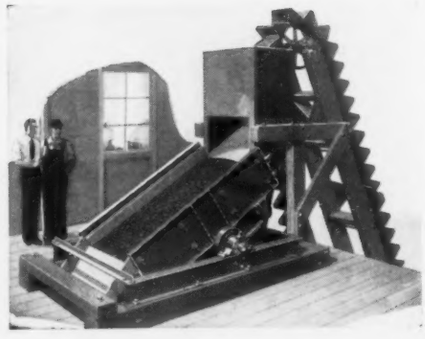
Has Been Created for Us by the Shaw Classifier,"

says the McGrath Sand & Gravel Co. in a recent advertising circular.

Probably no other sand classifier gives such accuracy of grading as this unit. It will clean and classify to a degree that will meet the most exacting specifications—not only commercial sand, but will make special grades such as asphalt, filter, engine, gypsum and glass sand. By using a series of Shaw classifiers two or more grades of sand can be made at the same time, or mixed into any combination.

Which Type of Screen?

The Vibrating Screen



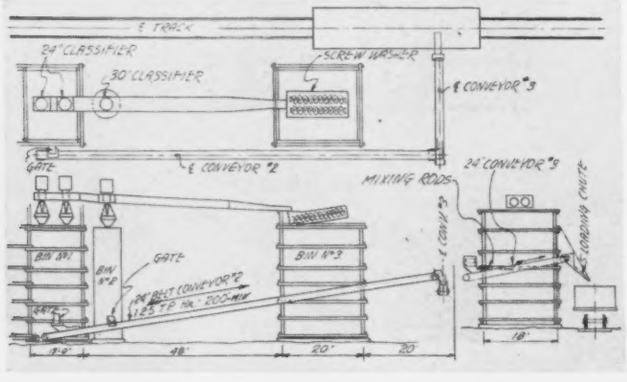
for greatest accuracy in screening and sizing. The "PD" (Positive Drive) type is particularly well adapted to handle the larger sizes of gravel, stone, and such sticky materials as damp sand, slag, etc. The "NP" (Unbalanced-Pulley) type is especially effective in the careful screening of borax, cement, clay, gypsum, lime, sand, small gravel, crushed stone, etc. A fully enclosed housing can be provided, when required, where the material is of a dusty nature.

Iowa Producer Adds Sand Blending Facilities

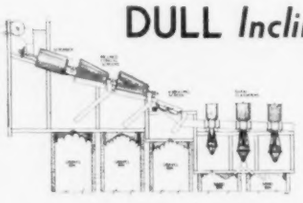
Changing specifications calling for accurate proportions of graded materials used on various government projects, are causing operators to revamp their classifying, screening, handling, and blending systems.

The Northern Gravel Company of Muscatine, Iowa, added facilities, as illustrated below, to meet the new specifications for sand on Mississippi River lock and dam construction. This installation consists of the addition of Shaw Classifiers with some rearrangement of bin facilities, conveyors, etc.

This permits the separation of sand into three distinct gradations and combinations of these. Almost any combination of sand grades that reasonably may be expected, can now be produced quickly and economically.



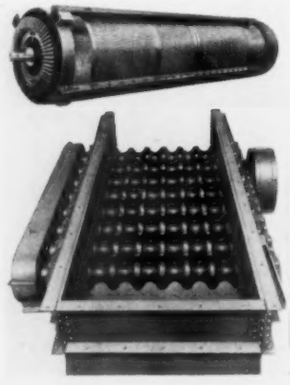
DULL *Inclined Conical Screens*



Still foremost in sand and gravel washing and sizing. Their many advantages and conspicuous success over a period of more than 20 years are known wherever sand and gravel is prepared.

Other Types of Screens

The 60-in. diameter trunnion type scrubber screen illustrated below is one of a number of types of revolving and cylindrical screens which are available in various sizes and capacities to meet almost any condition.



The rotary disc-grizzly (bottom left) is very efficient in the screening or "scalping" of large size materials such as stone, etc. It handles the material gently, has large capacity and in many instances is used where the cylindrical revolving screen formerly would have been employed. The disc shafts operate in the same direction but have different and successively higher speeds.

NEWS
AND PREPARING MATERIALS

INDIANAPOLIS, ATLANTA, SAN FRANCISCO, TORONTO 5180

Becker County—Shiely Co. Builds Unique Plants for Producing Gravel Fill for Ft. Peck Dam

The above illustration shows one of the two Link-Belt portable gravel screening and loading plants for this project. These plants produce and load into cars, the gravel for toe of earth-filled dam being built at Ft. Peck, Montana. The sand is screened out and returned to pit, the oversize being delivered to trucks for disposal. Capacity of each plant, 550 tons per hour of pit run material.

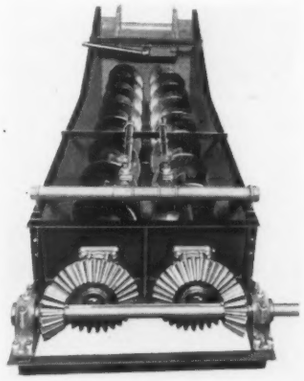
Selecting the Correct Scrubbing and Washing Method

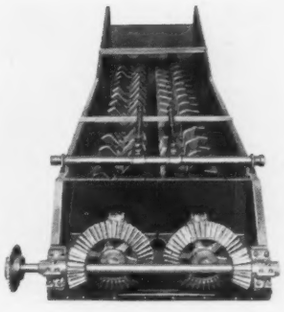
A preliminary scrubber of this type, in combination with Dull inclined conical screens, will frequently clean many materials better than the more expensive types of scrubbers. It consists of a solid cylindrical shell with interval retaining rings, dividing the length into compartments which retard the progress of the material through the scrubber, while lifting vanes raise and drop the material into a bath of water.

Log and Screw Washers

The Screw Washer is frequently used on both gravel and stone for breaking clay or dirt that cannot be broken up in a revolving scrubber. Some varieties of clay will form into balls in a revolving machine, but can be broken up by a screw washer because of the grinding action of the stones on each other. The paddle or log washer is similar to the screw washer except that the action is more violent in the paddle washer. The Link-Belt screw washer is made with heavy hollow shaft on which are mounted the flights with hardened steel wearing shoes.

The log washer is similar in construction, except that it is usually made with renewable manganese steel paddles mounted on a hollow square shaft.



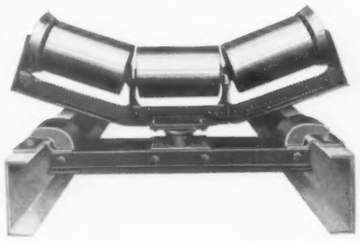


Assuring Long Life of Belt Conveyors

The essentials to economical belt conveyor service are all embodied in the Link-Belt line of anti-friction belt conveyors. Special attention has been given to the idler, the most vital part of the belt conveyor. Send for complete engineering data book No. 1615.

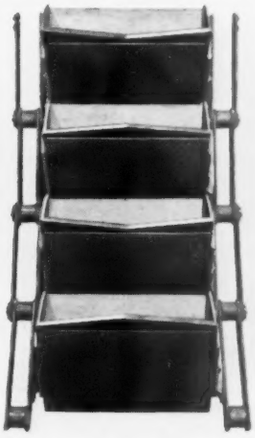
The Self-Aligning Idler

The self-aligning idler is designed to operate automatically in guiding the belt to a central position on the carrying idlers at all times, whether running loaded or empty. It avoids using side guide rolls, with their danger of injury to the edges of the belt in case of mis-alignment.

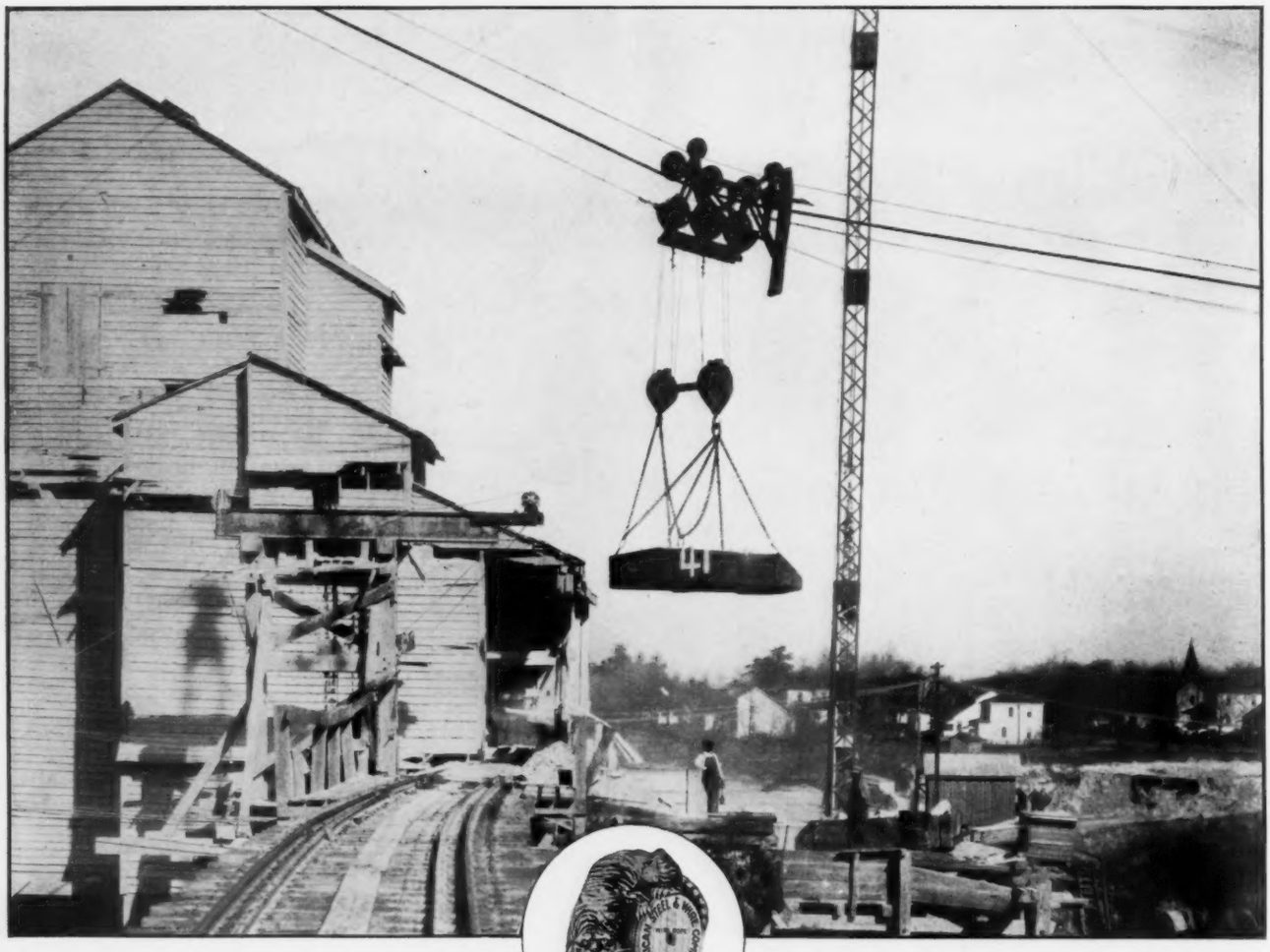


Bucket Elevators

Three general types of bucket elevators are adaptable to the work of raising materials at gravel and stone plants. These are (1) the continuous bucket elevator; (2) the centrifugal discharge elevator, and (3) the digging elevator. Link-Belt makes the complete line of all three types for every capacity and service condition.



IN PIT—IN AIR —ON SURFACE—



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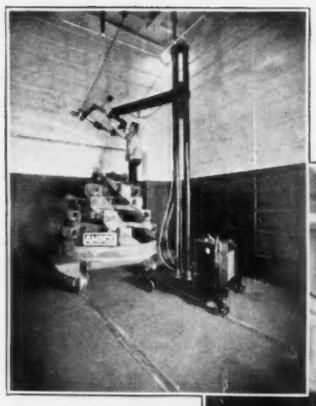
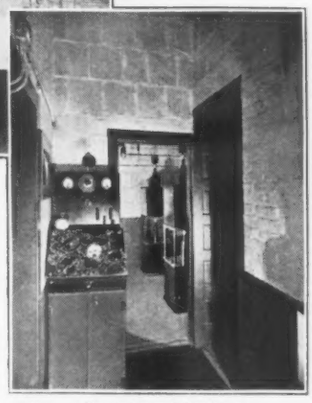
X-RAYED



Exposure room, showing X-ray tube stand — indicating flexibility of apparatus.

Exterior view — AMSCO X-ray Laboratory.



Control stand, looking toward machine room.

To Insure Sounder Castings!

The last word has not been said in more closely adapting metal compositions to definite service conditions. Neither is it impossible to improve standards of design, foundry procedure, and heat-treatments of alloy steel castings so that they will more efficiently and economically serve their intended purposes.

But so much has been accomplished in these fields that the AMSCO Research Department has turned its attention to another and more pressing problem — that of giving the user of AMSCO Manganese Steel or AMSCO Alloys, castings of such reliable soundness as will enable the alloy steel to develop its potential efficiency and economy to the greatest extent.

With the visual evidence given the engineer and foundryman by the X-ray of internal defects otherwise not identifiable, problems of design and foundry method are sooner or later solved. This scientific tool enables the establishment of standards that result in commercially sound castings being consistently produced, fully adequate to the intended service requirements.

This expensive equipment will pay for itself in greater economy both for AMSCO and our customers. To avail *yourself* of these benefits, insist that your Manganese Steel or Nickel-Chromium Alloy Castings shall be AMSCO made.

AMERICAN MANGANESE STEEL COMPANY
Division of American Brake Shoe & Foundry Company
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PUMP

with the patent

Wear Resister

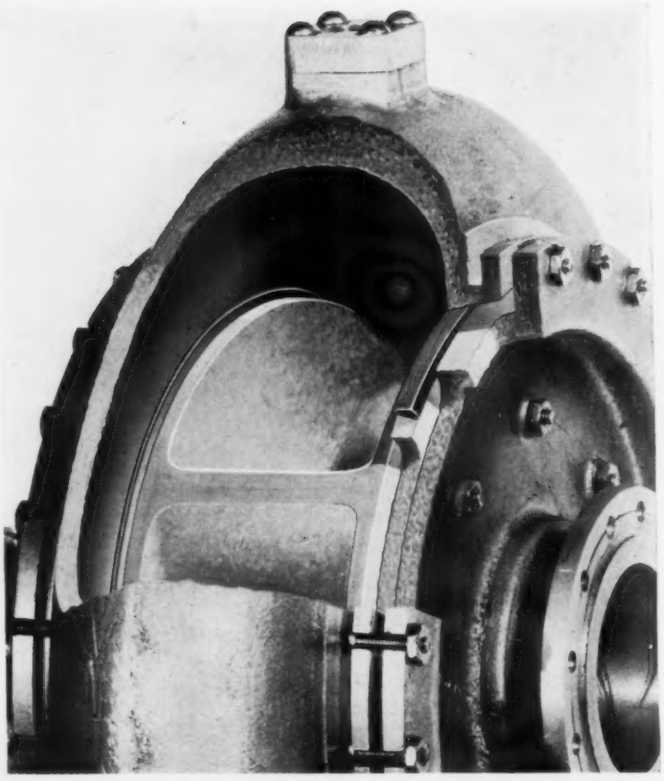
ALL dredge pumps have a common enemy, WEAR—the constant abrasion of sand and sludge that attacks the bare metal surfaces.

Wear cannot be eliminated entirely, but it can be checked appreciably by protecting the vital parts of the pump from direct abrasion.

That is the purpose and function of the WEAR RESISTER—an outstanding development of P. M. Co. engineers that sets a new standard of pump performance. It protects the shell, side plates and liners at vital points, increasing pump life and reducing repair costs.

This is why Diamond Dredge Pumps are *different*. They are made of genuine Diamond Manganese Steel—and then this super-wear metal is insured against direct abrasion with the WEAR RESISTER. It is a difference measured in years of service, dollars in savings and the advantages that go with complete satisfaction.

Write for details of Diamond Dredge Pumps —all sizes for all uses. And remember that the WEAR RESISTER is adaptable to your present installation.



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P. M. Co. Products include Traveling Chain Cutters, Flap Valves, Nipples, Elbows, Jaw Plates, Crusher Parts, Dippers, Dipper Teeth, Bucket Lips, Sheaves and many other Manganese Steel Equipment Parts.

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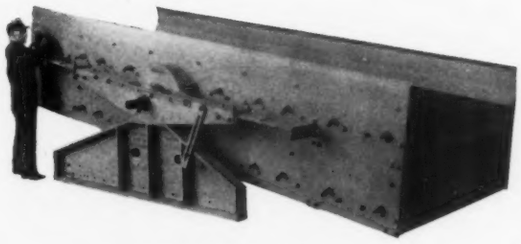
of

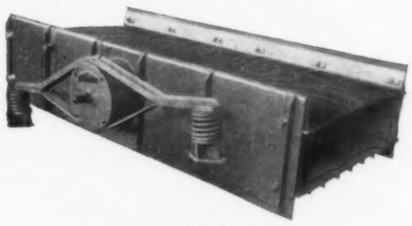
VIBRATING SCREENS
SCREEN CLOTH
BELT CONVEYORS
BUCKET ELEVATORS

for repairs, replacements or extensions to your plant

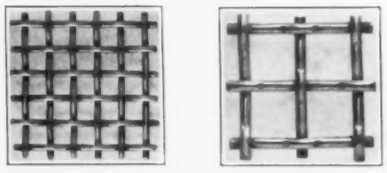


ROBINS GYREX
With Angle Adjustment
6′x16′ size shown

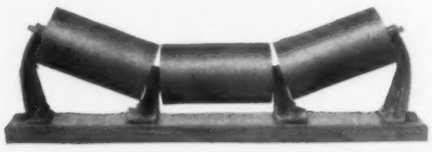
ROBINS GYREX
For Suspended Mounting
4′x10′ size shown



ROBINS VIBREX
For Fine Screening
4′x8½′ size shown



ROBINS GYRALOY and SUPER-GYRALOY SCREEN CLOTH



ROBINS CONVEYOR IDLER

GYREX SCREENS—Sizes 2′x1½′ to 6′x16′; Single, double and triple deck; Uniform action over entire screen surface; Angle adjustment; Positive throw; Optional stroke; Cast or structural steel base; For floor-mounting or cable-suspension; Unobstructed screen surface; Automatic cloth tensioning. More than 100 popular priced standard models to choose from. An ideal screen for scalping, accurate sizing, washing or dewatering. Has many advanced features. SEND FOR BULLETIN 90.

VIBREX SCREENS—Unbalanced principle with adjustable stroke. Sizes 3′x6½′ to 4′x10′; Single and double deck; Angle adjustment; Tensioned screen cloth; Can be suspended or floor-mounted. A light, high-speed screen for accurate *fine* sizing. Just the thing for making stone sand. Also an incidental-purpose screen for intermediate screening or re-screening. SEND FOR BULLETIN 93.

GYRALOY and SUPER-GYRALOY Screen Cloth. These new alloy screen cloths have extraordinary resistance to wear. GYRALOY is low priced and lasts longer than spring steel. SUPER-GYRALOY is especially hard and tough—the best for conditions of severe abrasion. Use GYRALOY and SUPER-GYRALOY and reduce your screen cloth costs. SEND FOR BULLETIN 89.

ROBINS IDLERS have one-shot lubrication (completely greased from one fitting—on either end) and piston-ring type check-valve grease seals that keep out dirt and prevent waste of grease. Your choice of ball or roller bearings; Standard pulley diameters of 4″, 5″ or 6″, in steel, cast iron or rubber-covered. There are no finer idlers made. Popular prices. SEND FOR HANDBOOK OF BELT CONVEYOR DESIGN—BULLETIN 82.

PREVENT SPILL and BELT DAMAGE by keeping your belts running absolutely straight with ROBINS TRAINING IDLERS. For top or return belts. Something new and something worthwhile. SEND FOR BULLETIN 85-A.

ALSO standard and ROBINS-ORO heavy-duty manganese feeders trippers, rubber belts, gates of all kinds, gears, pillow blocks, and design and construction of complete plants.

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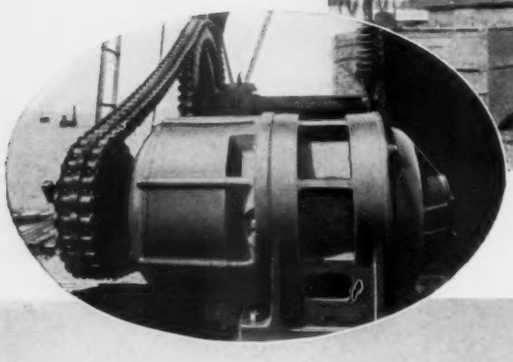
London
Johannesburg

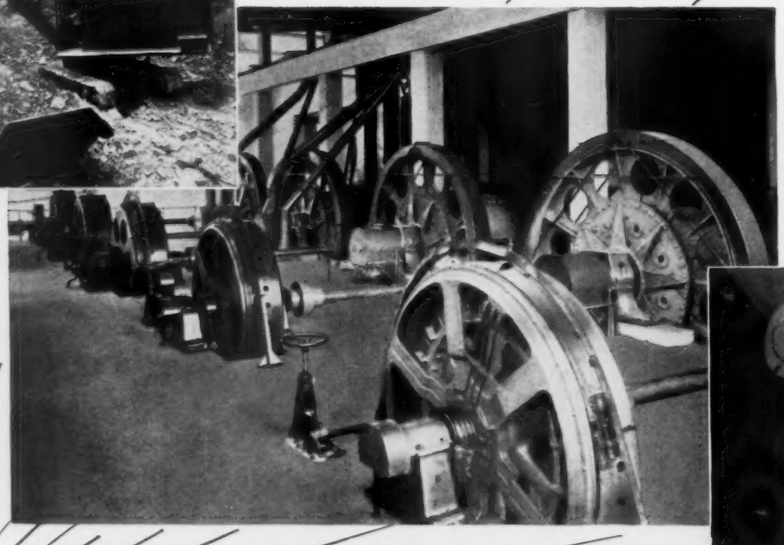
If you need a dependable low-speed motor that can be connected directly to your kiln or cooler gears, conveyors, car pullers, feeders, etc., use a G-E gear-motor. They are compact low-speed drives that deliver their full-rated power at the output shaft at almost any speed from 13 to 600 rpm.



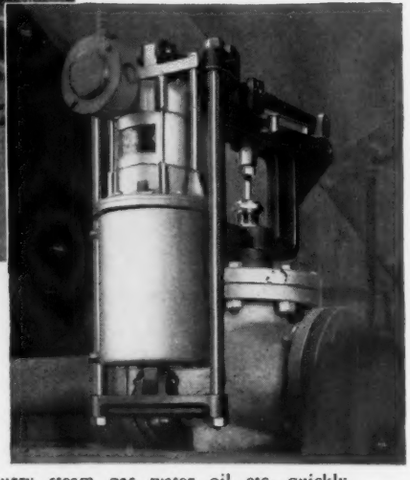
For all motors and control, be sure to see General Electric first. From our complete line, we can supply the RIGHT MOTOR and the RIGHT CONTROL for every drive in the rock products industry. Remember, perfectly matched motors and control promote greater economy

FOR EVERYTHING ELECTRIC

For cable, too, see G.E. Most of your jobs, especially electric shovels, need tough cable. For this service, G-E Tellurium-compounded cable has proved its worth. We can supply cable of every type, size, and voltage for use about your plant



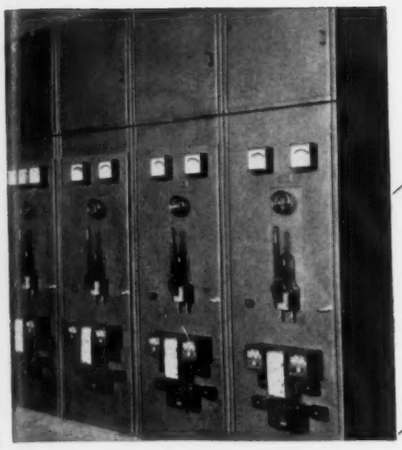
NRA MEMBER U.S. WE DO OUR PART



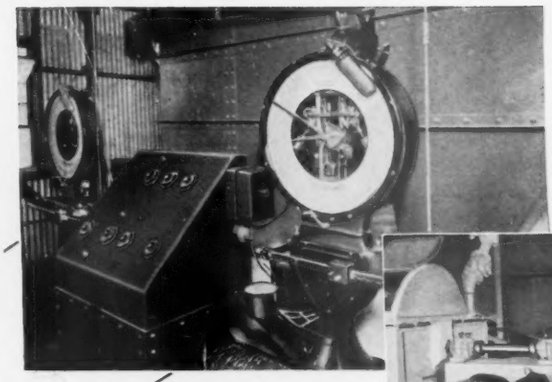
For driving tube mills, use the G-E Super Synchronous motor. Synchronized before its load is started, this motor will accelerate unusually heavy loads smoothly, and synchronize them without excessive demands on the power supply or stress on mechanical equipment

To handle slurry, steam, gas, water, oil, etc., quickly and easily by remote control, use a G-E Thrustor valve—a superior valve operated by a Thrustor. In cement, amesite, or ready-mix plants, they provide the best means of automatically proportioning the raw materials

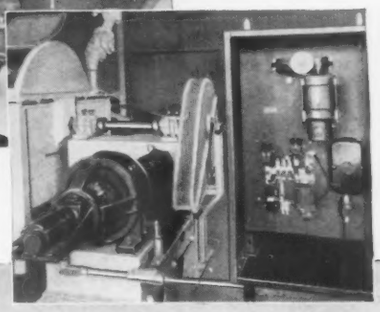
G E N E R A L



In modernizing your plant, use G-E shipped-assembled switchgear. Each unit comes completely wired, ready for installation. Consider the saving! G.E. makes a complete line of switchgear and control for your every need



If you want to synchronize two or more drives, such as the kiln with its feeder, a number of conveyors, or other related units, use G-E Selsyn devices. Ask a G-E sales engineer to tell you more about this important modernization tool



Here's a G-E photoelectric relay automatically weighing the ingredients in a ready-mix batching plant. There are dozens of other jobs that "electric eyes" can do with new economy and efficiency. Write for a copy of *G-E Photoelectric Relays*, GEA-1654A

SEE GENERAL ELECTRIC

SEE General Electric first! There you can buy, from a dependable manufacturer, all the electric equipment you need for a modern rock products plant, on one order blank.

General Electric can meet every need with dependable equipment, progressive engineering, and prompt, competent service.

Not the least of these is service—reliable, matched G-E renewal parts are available for an emergency. Conveniently located service shops and warehouses and reliable G-E sales offices are at your service and are always ready to help you to the most economical solution of your problems.

Illustrated on this page are a few of the many time- and money-saving equipments in our extensive rock products line—equipments that will stay on the job, year after year, with G-E reliability. If you would like additional information on any of these items, please write or call the nearest G-E office, or General Electric, Dept. 6D-201, Schenectady, N. Y.

For rotary cement kilns, coal conveyors, chain-grate stokers—wherever you need an efficient, adjustable-speed drive with good speed regulation—use a BTA motor. With it, you can obtain directly from an a-c. source the most desirable characteristics of a d-c. shunt motor. Send for bulletin GEA-712B

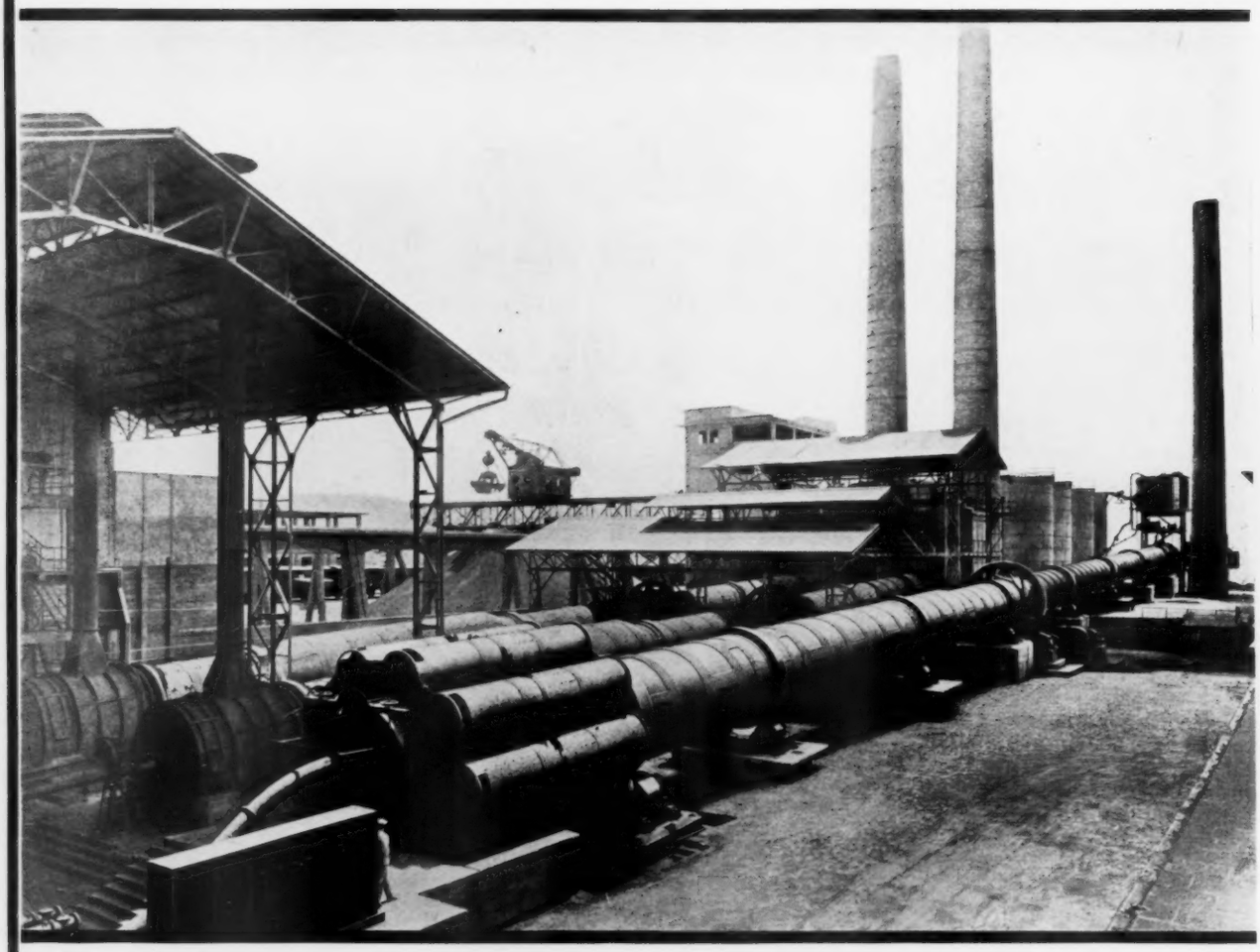
020-1

E L E C T R I C

MODERN ROTARY KILNS

•

WILL SAVE IN FUEL



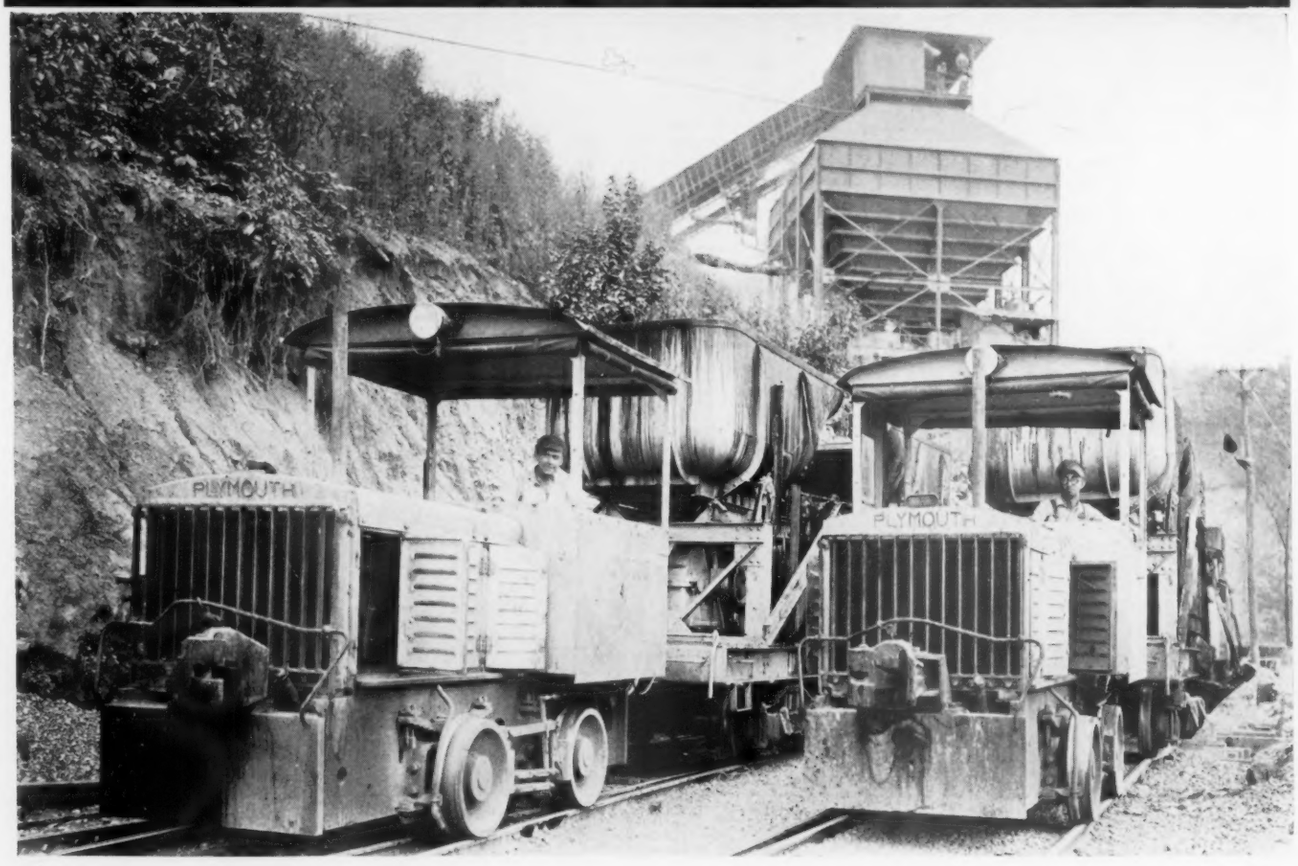
THIS UNAX KILN IS 500′ LONG

F. L. SMIDTH & CO.

ENGINEERS

225 BROADWAY NEW YORK, N. Y.

TVA buys FOUR PLYMOUTHS for NORRIS DAM·



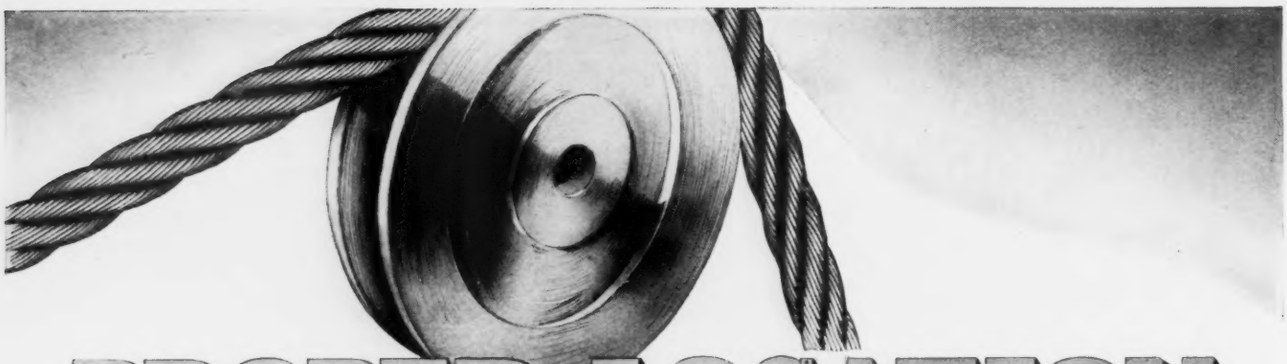
NORRIS DAM will be 210 ft. thick at the base, 212 ft. high to the crest of the spillway. Still forty feet higher will be a 22 ft. roadway to be completed in 1936, at a cost of $35,000,000.00.

The mixing plant in rear contains three 3-yd. concrete mixers. Each Plymouth hauls one car containing two 3-yd. buckets. Each car is hauled 500 ft. where the contents of both buckets are dumped into a traveling 6-yd. bucket. A cable then transfers this bucket to the concrete forms of the dam proper where the material is dumped. The bucket is returned and the operation is repeated.

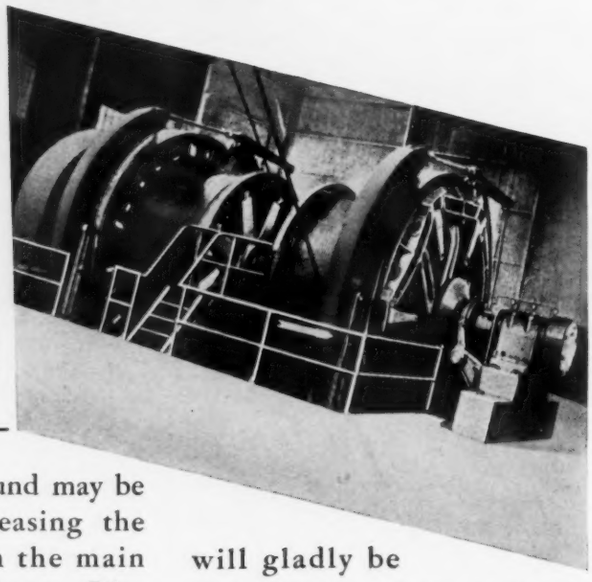
Four Plymouths are used. Service is maintained 24 hours a day.

PLYMOUTH » GASOLINE » » DIESEL »
GAS ELECTRIC DIESEL ELECTRIC
LOCOMOTIVES

PLYMOUTH LOCOMOTIVE WORKS, PLYMOUTH, OHIO, U.S.A.



PROPER LOCATION of the MAIN SHEAVE will give longer ROPE LIFE



Know your Ropes

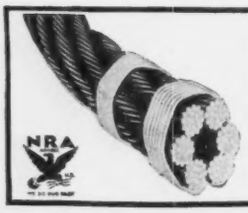
...This is a helpful hint, how to make wire rope last longer. Subsequent Wickwire Spencer advertisements in this publication will give other dollar saving information. Tell us about your rope problem and we will give you the answer.

The fleet angle, that is, the angle formed by lines drawn from the main sheave to both right and left rims of the hoisting drum should never be more than 3 degrees. If there is a greater angle needless side wear of the rope always occurs. This is true of both grooved and smooth drums. The condition when found may be corrected by increasing the distance between the main sheave and the drum. Diagrams, showing the proper location of the main sheave, will gladly be sent to you upon request.

•

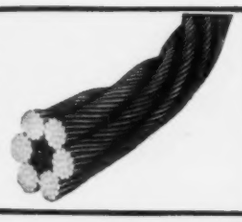
WICKWIRE SPENCER STEEL COMPANY, New York City; Buffalo, Chicago, Worcester; *Pacific Coast Headquarters:* San Francisco; *Warehouses:* Portland, Los Angeles, Seattle. *Export Sales Dept.,* New York City.

WIRE ROPE *by Wickwire Spencer*



BOTH...STANDARD LAY AND WISSCOLAY PREFORMED.

Wickwire Spencer manufactures all sizes and types of Wire Rope in standard lays and preformed. Wisscolay preformed wire rope will often solve a wire rope application difficulty. Ask our engineers where and when it should be used. Send for a free WIRE ROPE BOOK. *It will prove of great value.*

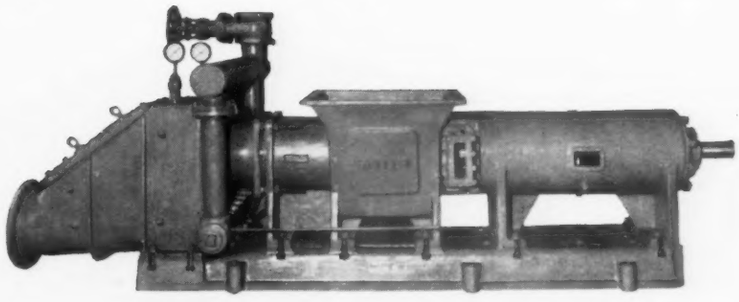


FULLER-KINYON PUMPS | CAR AND BARGE UNLOADERS | PULVERIZED MATERIAL FEEDERS

Fuller-Kinyon Systems

The remarkable power economy of the Type "H" Pump is due to automatically stabilized low pressure operation with low material velocities and maintained minimum material densities. The pump can be adjusted, while in operation, for the minimum power input under full capacity conditions. For lighter loads, as when one or more mills of a group is idle, a check valve automatically assists in maintaining a minimum seal density. If the pump is used under an open bin, such as car and truck hoppers, this valve prevents dusting when the feed is interrupted.

The screw shaft can be removed through a port in the check valve body without removing the bearings or disturbing their alignment. The bearings are automatically oil lubricated.

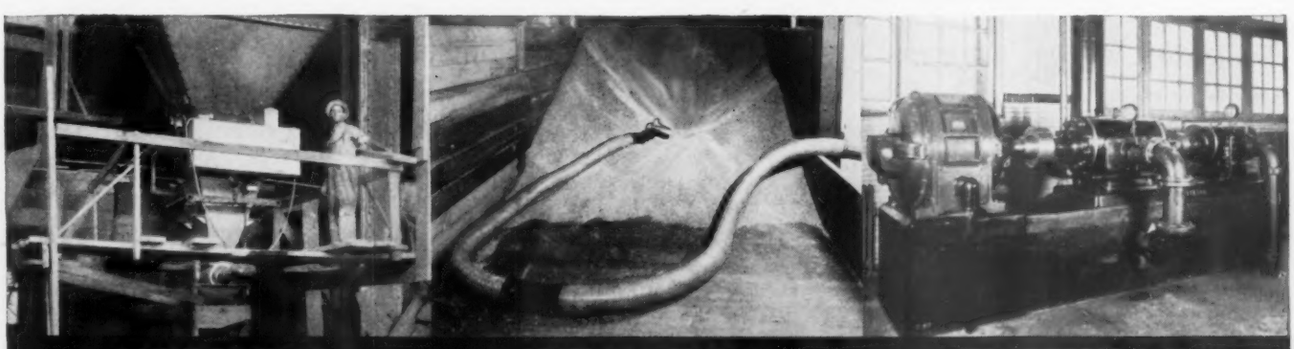


THE FULLER-KINYON
TYPE H PUMP

This new pump offers you unexcelled power economy in the handling of dry pulverized materials, with controlled efficient operation under light as well as full loads. These operating characteristics have definitely been established by a year of use in many classes of commercial service, preceded by exhaustive trials.

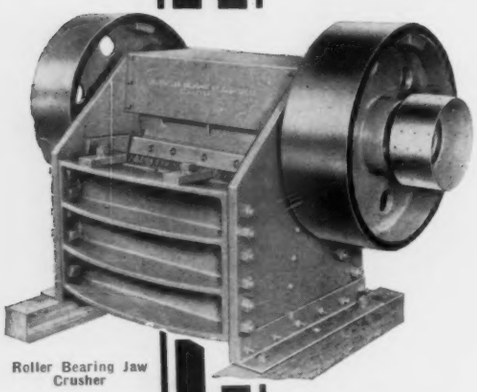
Fuller Company
CATASAUQUA, PENNA. U. S. A.

Chicago: 1118 Marquette Building.
Paris: E. Constantin, 105 Rue Lafayette.
Hamburg: Claudius Peters, Walhof, Glockengiesserwall 2.



CEMENT WEIGHING BATCHERS | AIRVEYOR PNEUMATIC CONVEYORS | COMPRESSORS AND VACUUM PUMPS

Specify the Gruendler Line for profitable crushing

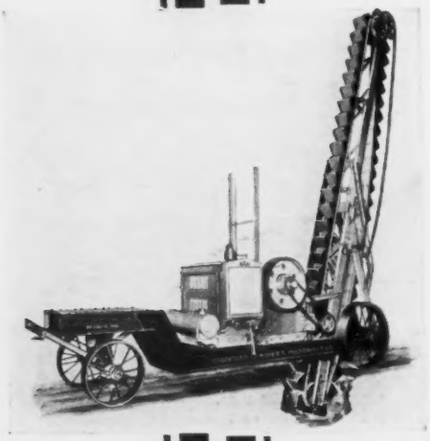


Roller Bearing Jaw Crusher

ON quarry jobs or in road building work, you need the cost-saving features of Gruendler equipment to insure maximum operating profits.

To meet unusual demands for finer sizes, you can get a uniform product in **one reduction** with Gruendler Roller Bearing Crushers, increasing capacity, saving power and cutting lubrication costs. Such economies do not come by chance. They are the result of half a century of development in building and testing crushers in the hardest kind of service.

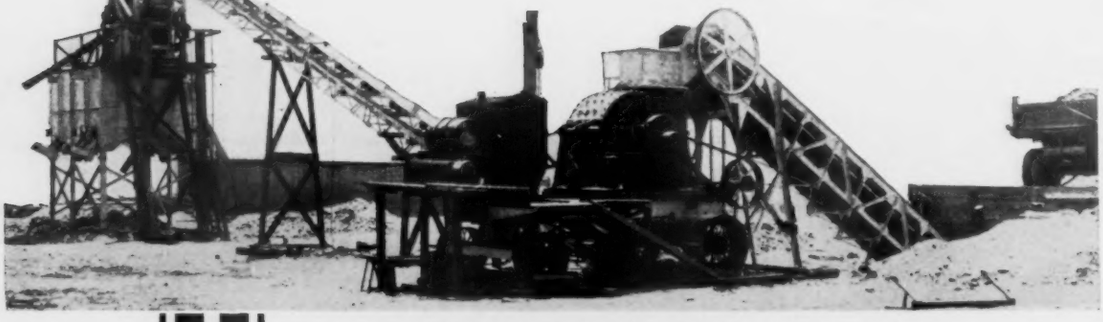
HEAVY DUTY CRUSHERS include the Gruendler-Blake type 24x36 All-Steel Crushers for reducing hard materials to as fine as 2½" and under—or the Gruendler Modern Roller Bearing type 15x24 and 15x36 for crushing 3" to 1½" and under—or Gruendler Fine Reduction Roller Bearing Jaw Crushers for reducing from 2" down to 1½" and under. These machines are also furnished in combination with screening, elevating and conveying equipment for complete plants.



THE FORTY-NINER brings to the road builders of today the latest type of wheel mounted unit for crushing and elevating. The under-slung steel frame gives the special low feed for greater road balance. The rugged truck frame, riveted, braced, welded and of the most rigid design, assures perfect alignment of equipment at all times. A new balanced Portable Crushing Plant!

The Forty-Niner Portable Crushing Plant

UNIT PLANTS are built by Gruendler for all rock and gravel crushing and screening operations, and in all capacities from 100 to 4000 tons daily—stationary, semi-portable and full portable. Dependable performance and outstanding economy are winning scores of friends for these efficient unit plants. Write today for complete information.



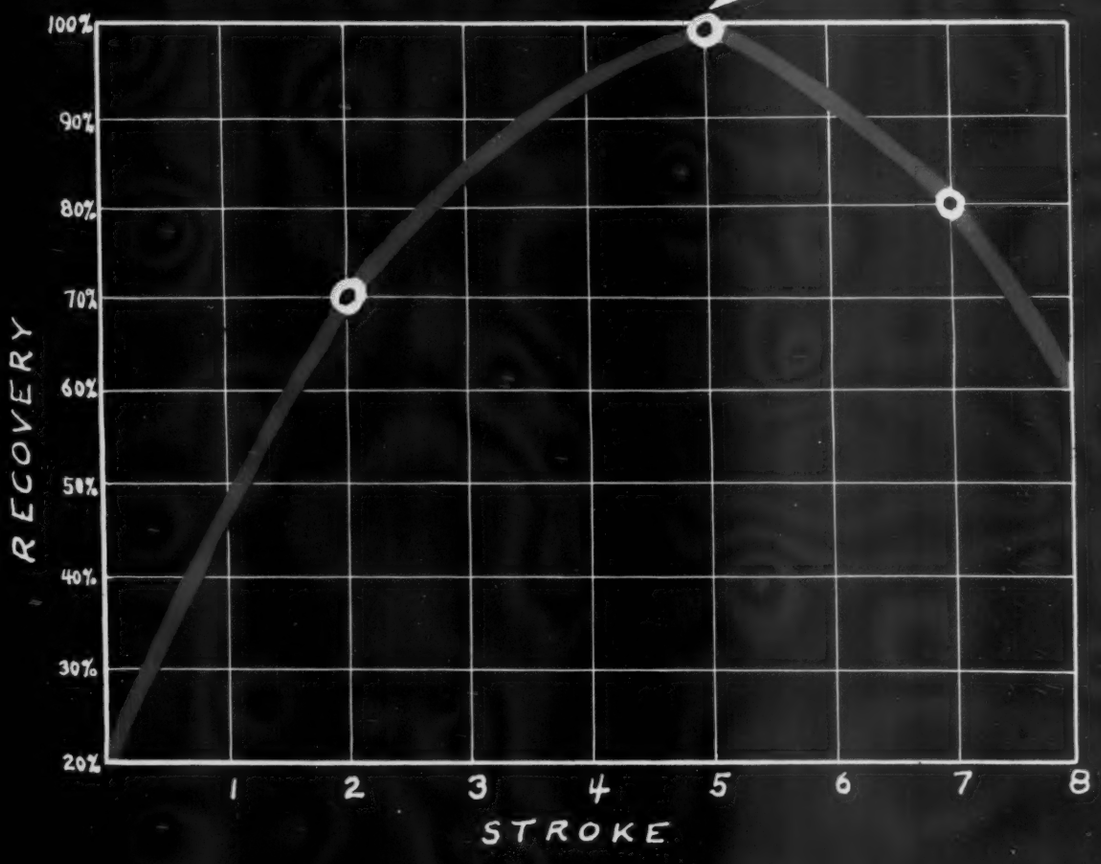
Complete Gruendler Portable Plant crushing 1200 tons per day of 3" and 400 tons of ¾" aggregate material in one reduction

Rock and Gravel Crushing and Screening Plants & Lime Pulverizers
Stationary, Semi-portable and Full-portable to Meet Any Situation

GRUENDLER CRUSHER & PULVERIZER CO.

Dept. P. & O. 2915 N. Market Street **St. Louis, Missouri**

Is Your Screening Efficiency Here



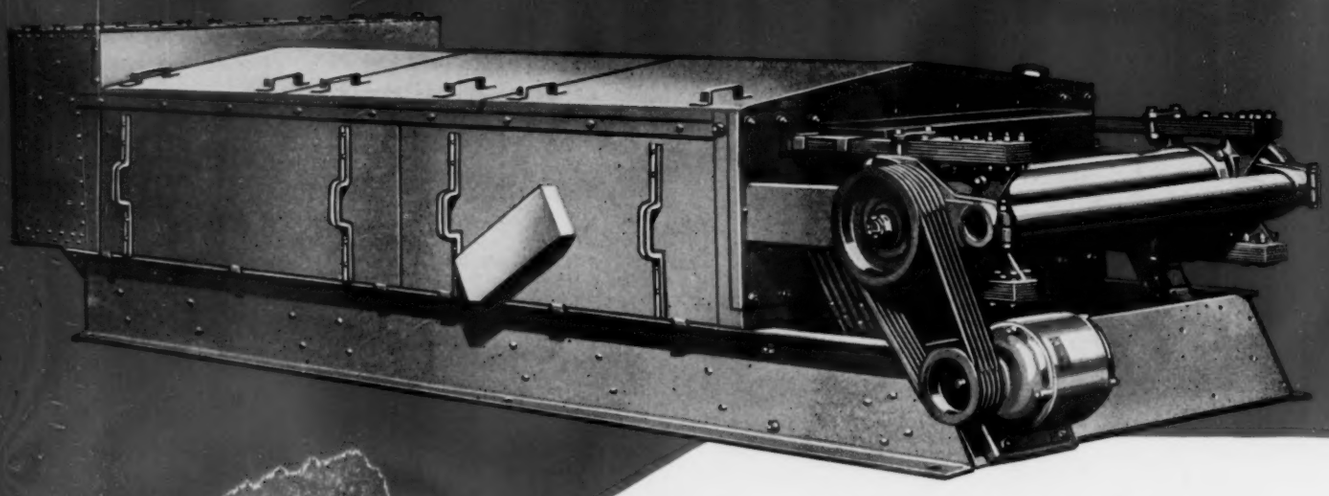
The JIGGER with CONTROLLED VIBRATION Assures Maximum Efficiency

The Only Machine with a Positive Adjustable Throw

WRITE FOR MORE INFORMATION

PRODUCTIVE EQUIPMENT CORP. 210 E. Ohio St., Chicago, Ill.

SYMONS SCREENS



For Hot, Dusty Screening

When screening hot or dusty materials, Symons Screens can be completely enclosed, yet the driving mechanism and motor are located outside of the enclosure and away from the heat and dust. When so enclosed, removable covers allow access to the screen, if desired. The driving mechanism is accessibly located out of the path of screened materials. This screen is ideal for hot, paving plants.

Other Features of

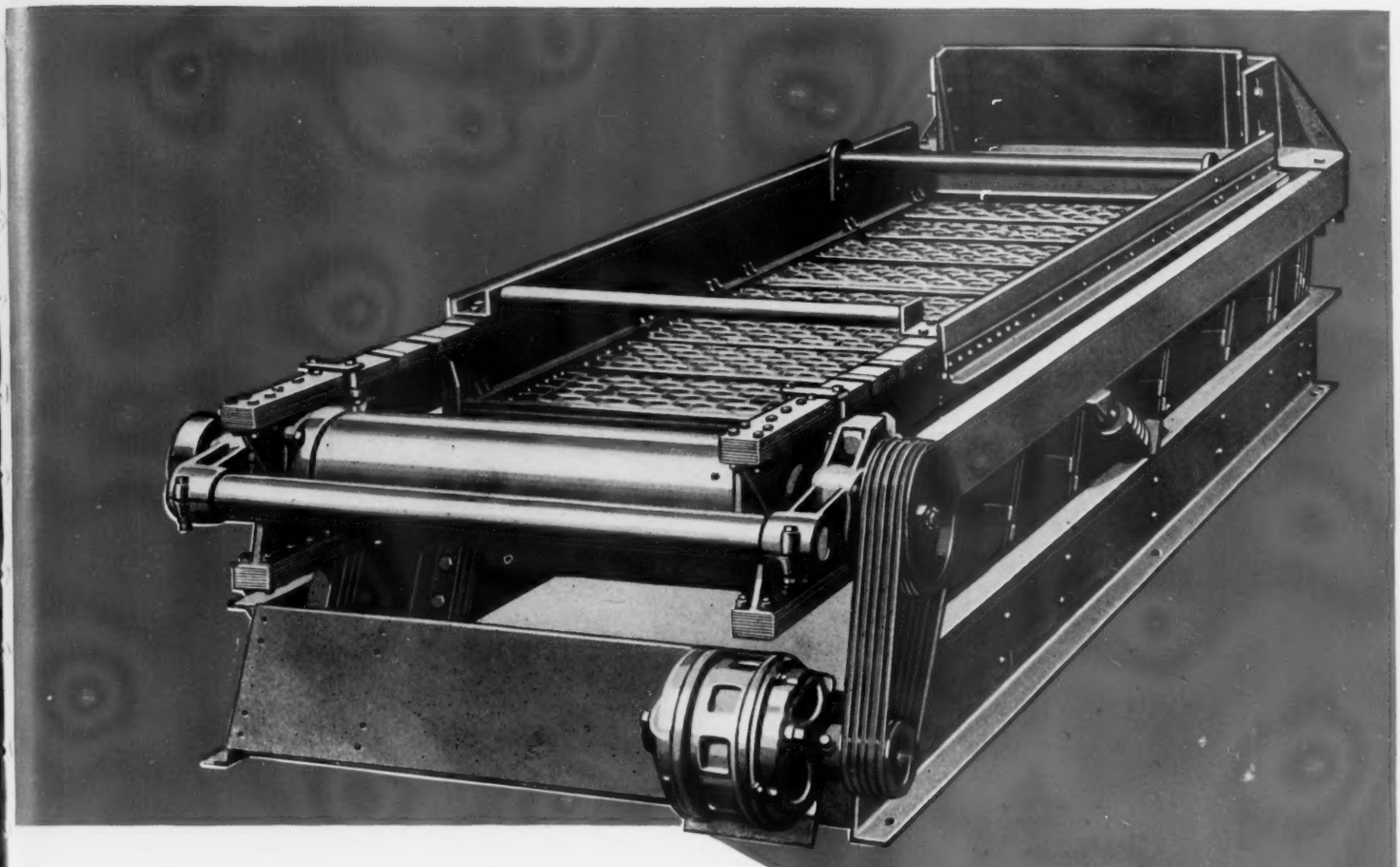
- **Close grading.**
- **Automatic feed.**
- **Easily Installed.**
- **Entire screen area has same movement.**
- **All bearings dust tight.**

Let Us Send You

NEW YORK CITY
60 E. 42nd St.

LOS ANGELES
Subway Term. Bldg.

NORDBERG



Set Level—Save Headroom

Symons Screens

- **Weight of screen deck not carried on bearings.**
- **All vibrating parts are counterbalanced.**
- **No grinding action between material and cloth. Life of screen cloth greatly lengthened.**

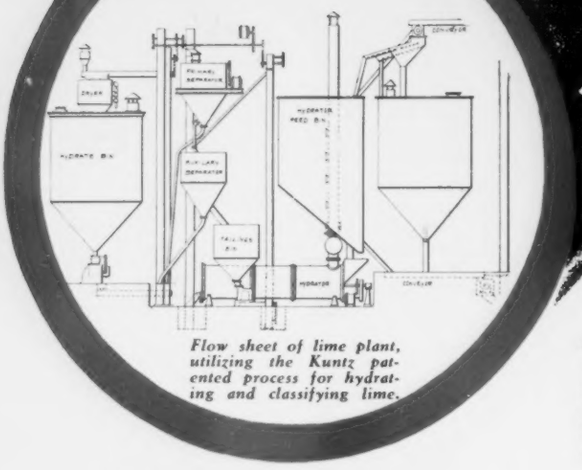
The advantages of a flat screen are readily recognized. Headroom is reduced to a minimum and is not increased regardless of the length of screen. Conveyors and elevators are shortened and installation costs are lowered. There is no bouncing or cascading along the deck, resulting in the most accurate grading. Here at last is the screen with the action and performance that producers of screened materials have long desired.

Bulletin TU65

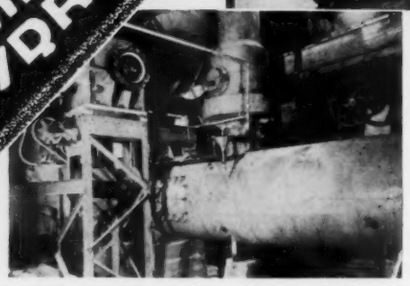
MFG. CO. MILWAUKEE, WISCONSIN — LONDON, WC2, ENG. BUSH HOUSE

KUNTZ SYSTEM

LIME BURNING, HYDRATION AND PRODUCTION



Flow sheet of lime plant, utilizing the Kuntz patented process for hydrating and classifying lime.



KUNTZ installation at plant of Purdy & Green, Ltd., St. John, N. B. Hydrator with beater mill and return screw conveyor, illustrated at left. Upper picture shows elevator discharging by screw conveyor to separator. Hydrator stack at left.

FEATURES

- **Complete control**
- **Uniform quality product**
- **Maximum efficiency**
- **Wide adaptability**
- **Minimum power and labor**
- **Lowest cost per ton**
- **Minimum maintenance**
- **Maximum flexibility**

TODAY the Kuntz System of Lime Manufacture represents the result of thirty years' engineering experience in the design, manufacture, construction and operation of many different types of lime burning and hydrating equipment.

From this broad knowledge of the industry, its methods and its needs, have come two outstanding developments:

(1) Kuntz Automatic Continuous Lime Kiln

This method by its vastly greater economy is fast replacing the former method of using either the rotary kilns at a sacrifice in lime quality, or the vertical shaft kilns at the disadvantage of abnormally high production costs. As operators of rotary kilns know, certain changes occur in the lime which make it difficult to manufacture a product suitable for use as a caustic or a hydrate. Those who continue the use of the shaft kilns to maintain quality find themselves face to face with price competition.

These disadvantages are successfully overcome by the Kuntz Automatic Continuous Lime Kiln with its fuel economy, low operating and upkeep costs—and its proven ability to produce a uniformly high quality of lime.

(2) Kuntz Gravity System of Lime Hydration

This is the only type of plant which insures the processing of the lime at sufficiently low cost to provide a profit in the conversion, permitting the sale of hydrate lime at raw lime prices. This method has wide application for combination uses, and affords an unusually low investment cost.

For information regarding COMPLETE LIME PLANTS, write to Wm. J. Kuntz, Pres. & Gen. Mgr., LIME & HYDRATE PLANTS CO., Office: York, Penna. Works: York, Penna., Chicago, Ill., Belleville, Ontario, Canada, London, England.

KUNTZ

LIME & HYDRATE PLANTS CO.

DESIGNERS · MANUFACTURERS · ENGINEERS

YORK · PENNSYLVANIA

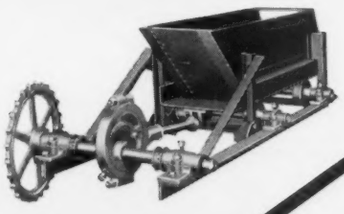
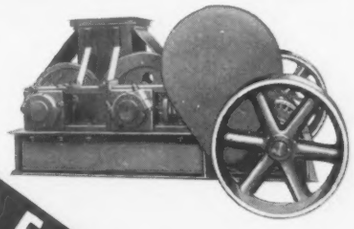
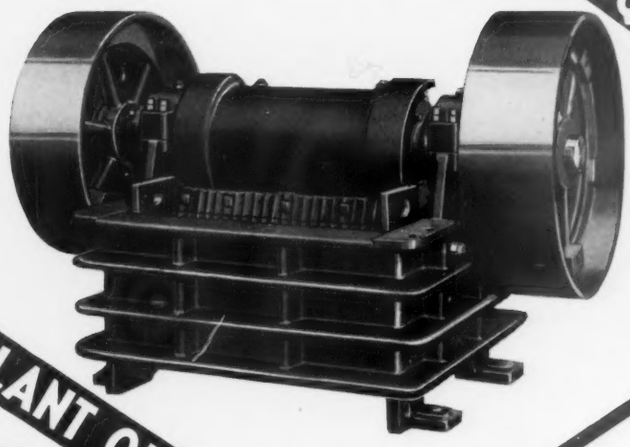


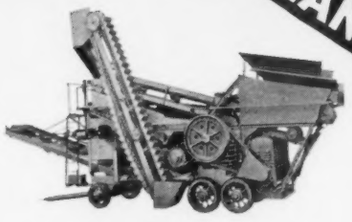
Plate Feeder



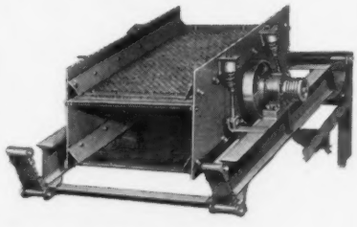
Roll Crusher

USE DIAMOND EQUIPMENT FOR SUCCESSFUL PLANT OPERATION

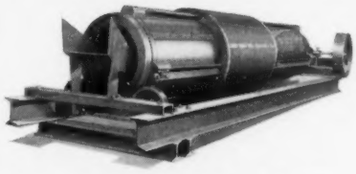




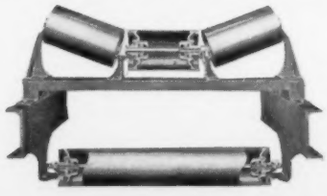
Crushing and Screening Plant



Vibrator Screen



Combination Scrubber and Screen



Anti-friction Belt Conveyor Rolls

DIAMOND IRON WORKS INC.

DIAMOND *ROLLER BEARING* CRUSHERS REDUCE HORSE-POWER AND MAINTENANCE

The DIAMOND *Roller Bearing* Crusher turns with such ease that when empty, a ¼ H. P. electric motor will run an 8"x36". Compare this with the difficulty which two men have in turning over an empty crusher of the plain bearing type. This simple test illustrates the power saving through the use of correct roller bearings in a rock crusher. In buying a crusher, consider the savings also in maintenance and lubricating expense.

All equipment for the sand and gravel plant manufactured by the DIAMOND IRON WORKS is of the same built-in quality as its famous roller bearing crusher. Write for catalog.

Established 1880

Diamond Iron Works, Inc.

MINNEAPOLIS, MINN. U.S.A.

Remember! when buying a Shovel, Dragline or Crane~

(1) Lima Type 601, 1½ yard shovel working on a highway job in Arizona.

(2) Lima draglines everywhere are making new records for high yardages and low operating costs.

(3) Lima Type 302 Crane handling timbers on a bridge job in Ohio.

that LIMAS are built in 3/4 YARD CAPACITY and LARGER

SHOVELS
CRANES
DRAGLINES
HOES

THE OHIO POWER SHOVEL CO.

DIVISION LIMA LOCOMOTIVE WORKS, INCORPORATED

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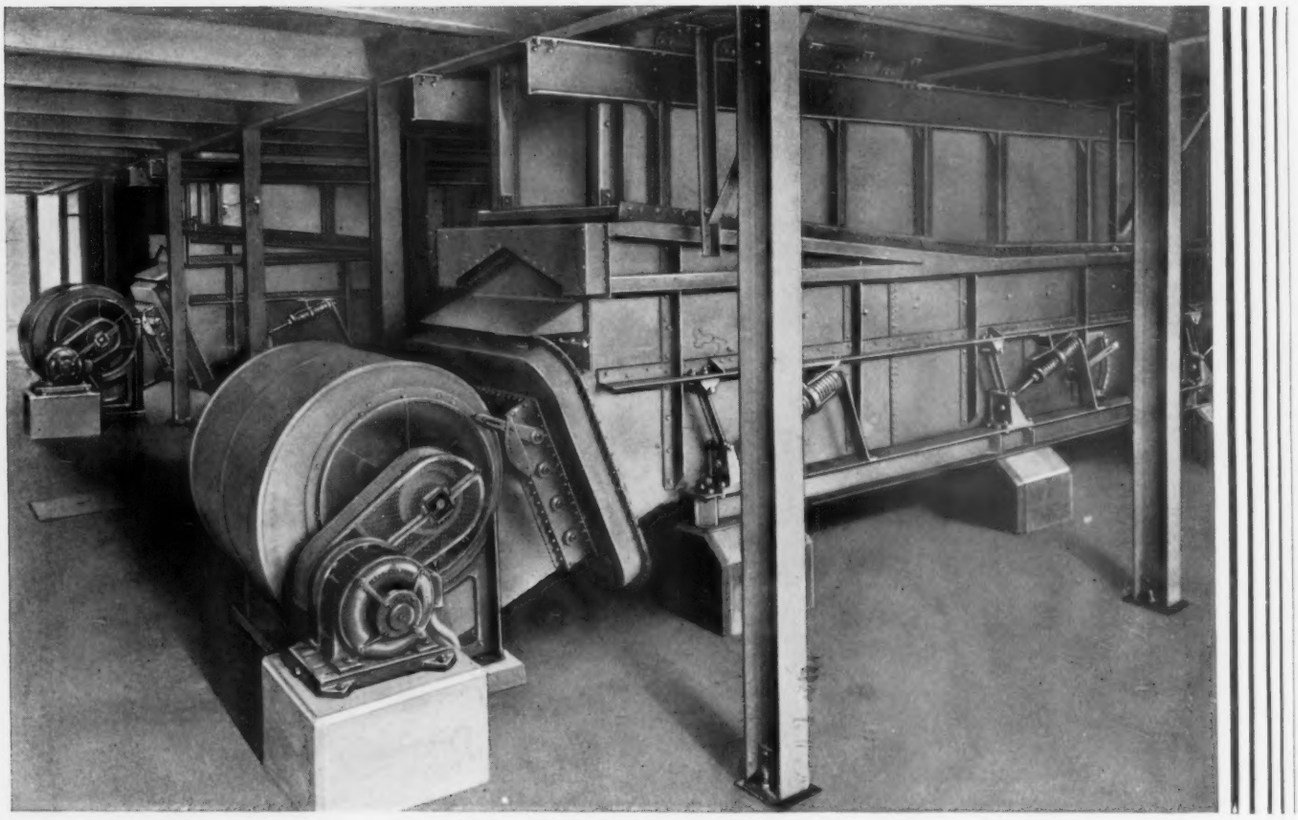
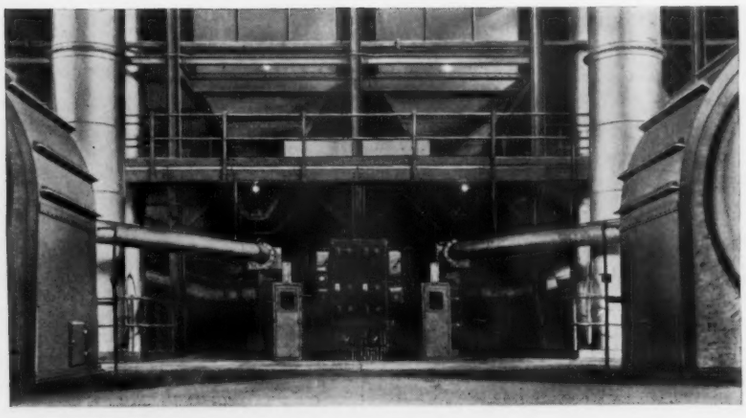
Tyee Machinery Co. Ltd. Vancouver, B. C.

3-4 YARD TO 2 YARD SHOVELS
1-2 YARD TO 3 YARD DRAGLINES



New Coolers Save Money

THE Allis-Chalmers Shaking Type Air Quenching Cooler has radical advantages over the usual rotary type. The clinker falls directly from the rotary kiln on to a shaking grate which forms a conveying surface. Cooling air from a duct below passing up through the agitated bed of hot clinker results in a very rapid exchange of heat from the clinker to the air. The recuperated heat is returned to the process with the primary and secondary air used for combustion in the kiln.



Installation of two 3'6" x 36' Air Quenching Clinker Coolers at Alpha Portland Cement Co., Alsen, N. Y. The larger illustration shows the feed end and the smaller the burning and control platform.

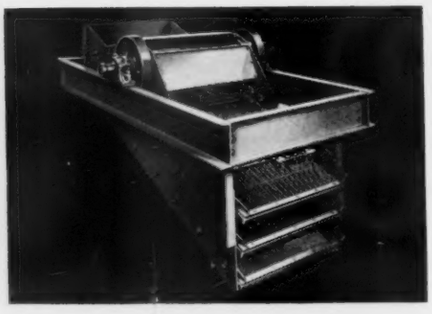
Besides cooling the clinker and saving fuel by recuperating most of the sensible heat, grinding costs are considerably reduced due to easier grindability of air quenching clinker. The cement produced has a more uniform and higher early strength. Power required to operate the shaking element of this new cooler and the fan for supplying cooling air, is considerably less than for a rotary cooler installation.

Nine Shaking Type Air Quenching coolers are in operation or under construction for installation in six different plants in this country and abroad.

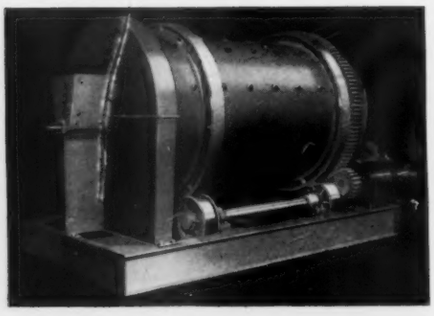
ALLIS-CHALMERS

— Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin, U.S.A. —

This Book SAVES TIME TROUBLE AND MONEY



THE NEW TELSMITH PULSATOR



THE NEW TELSMITH SUPER SCRUBBER

If you are in any way interested in the design, operation or management of a mine, quarry or gravel plant, or in the selection of its equipment, you will want this new book.

Authoritatively written, it describes and illustrates the most modern equipment now available. Every machine is designed and built to give you faster production and lower up-keep . . . to enable you to meet today's conditions and operate at a profit.

You'll want to know about Telsmith's latest engineering developments—the New Telsmith Pulsator and the New Telsmith Super Scrubber . . . latest improvements and new sizes of Telsmith crushers, plate feeders, gravity tanks, log washers, etc.

And this book contains the first table ever published by any manufacturer for figuring the capacities of vibrating screens of any size, and with any number of decks—of Telsmith or any other make of vibrator operating on the eccentric principle.

On every type of equipment . . . from crushers to bin gates . . . you'll find the book a dependable guide that will save you time, trouble and money. Sent without cost or obligation. Write for Bulletin E-15.

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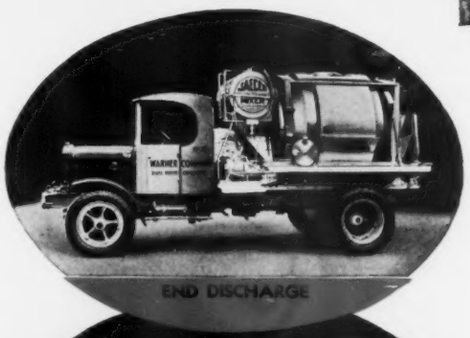
TELSMITH

BUILDING
Foundations, Piers, Bridges, Floors, Conduits, Buildings and All General Concrete Work!

Every Job's a Jaeger Job in 1935

PAVING
and Widening Streets, Roads, Alleys, Curb and Gutter Work, Sewers, and Sidewalks



BIG jobs and small ones, general construction and road work—they're all using Jaeger Truck Mixers this year to get lower costs and "Dual-Mix" higher strength concrete.

Producers and contractors have agreed that Jaegers are faster, get bigger yardage, cost less for upkeep, are more efficient in meeting job conditions. Built in both side-discharge and end-discharge types, 1 to 5 cubic yard capacities. Write for prices, full details to THE JAEGER MACHINE COMPANY, 602 Dublin Avenue, Columbus, Ohio.

RENTED BATCH TRUCKS MAKE THE LONG HAULS

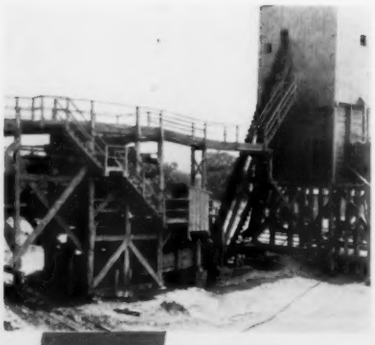
On road work or suburban deliveries, use Jaeger Transfer Loader. Keeps Truck Mixers on short hauls. More trips per day, more yardage.

Canadian cement plant using 36 x 60 primary crusher.

Portable crushing plant in Kansas, 200 cu. yds. per day capacity.

McLANAHAN

100th



MINNESOTA

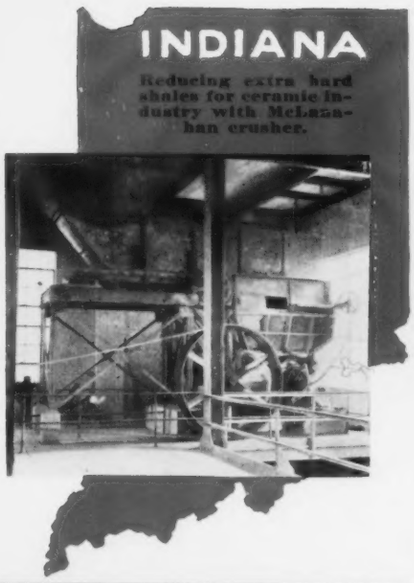
McLanahan jigs for concentrating iron ores—largest jig installation in the world.

TEXAS

Thousand-ton-per-day asphalt plant equipped with McLanahan primary crusher.

WEST VIRGINIA

Limestone washing plant using McLanahan steel log washers.



ANNIVERSARY
OF A WORLD-WIDE SERVICE

NINETEEN THIRTY-FIVE rounds out a century of service and progress for the McLanahan & Stone Corporation. This record of experience is marked by successful McLanahan installations that encircle the globe * * * throughout the United States and Canada * * * Mexico, Cuba, Puerto Rico and South America * * * and in far-flung countries like China and Australia. One hundred years of continuous development * * * weathering wars and depressions * * * steadily advancing the efficiency of McLanahan equipment—this is proof of progress. As the new year ushers in another century of McLanahan service, operators can use this time-tested equipment with assurance of increased profits in rock crushing, washing, sizing, handling and production operations. Let McLanahan engineers help work out your problems.

McLANAHAN & STONE CORPORATION
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KOEHRING

The New Koehring 801 Shovel

— is convertible to crane or dragline — furnished with gasoline, diesel, oil or electric power—independent and positive, chain or cable crowd — sturdy, high strength welded shovel boom — Koehring hydraulically cushioned clutch and the exclusive Koehring boom foot shock absorber . . . For more details and specifications—

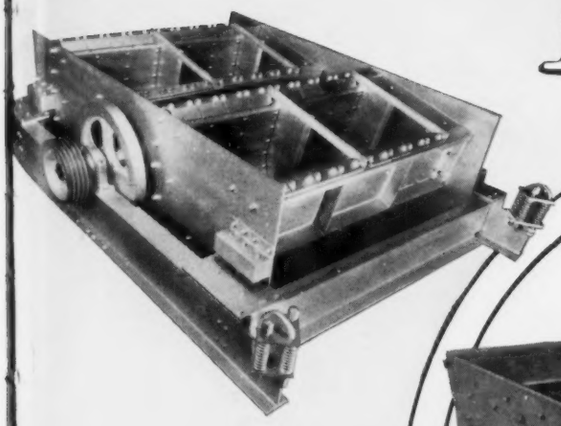
write for the new 801 bulletin.

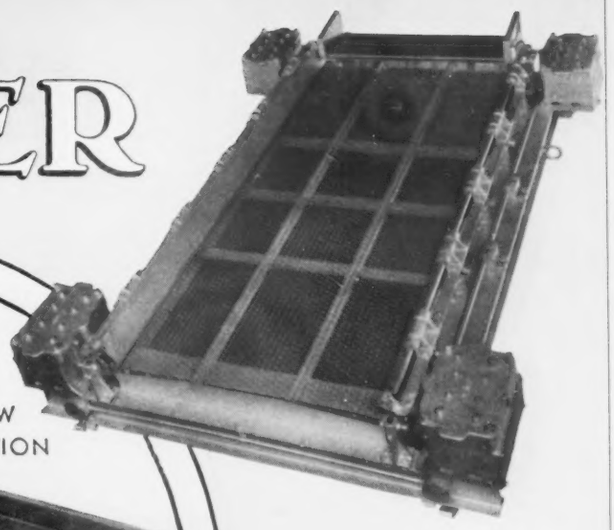
KOEHRING HEAVY DUTY

KOEHRING COMPANY

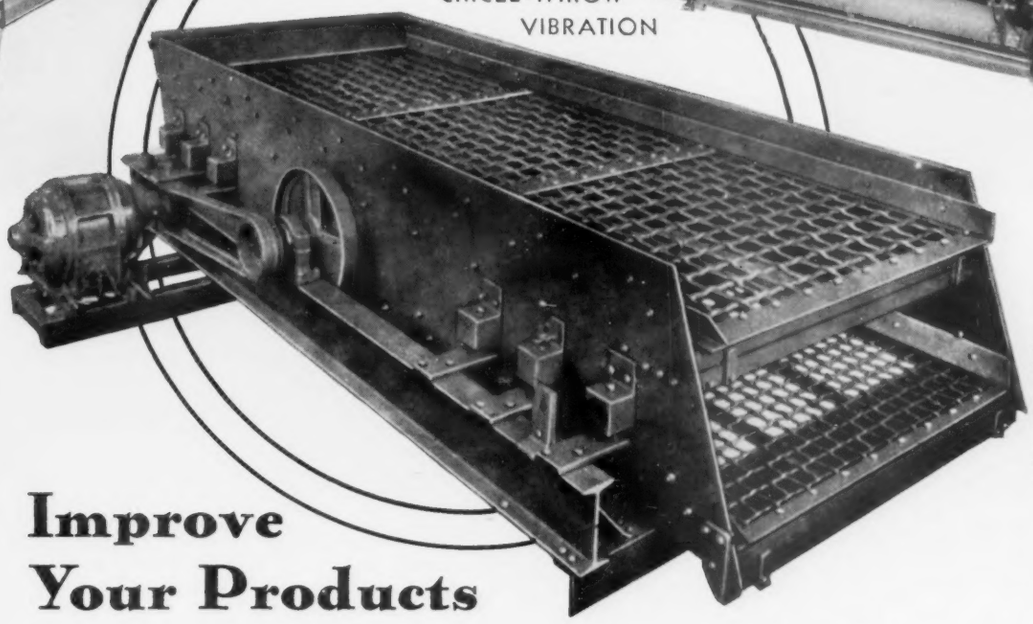
MILWAUKEE *Division of National Equipment Corporation* WISCONSIN

TYLER

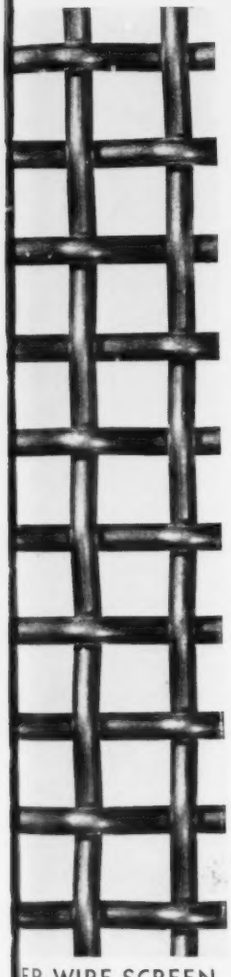




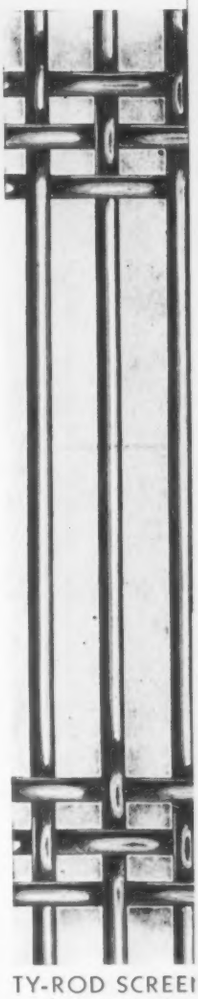
TYLER-NIAGARA
BALANCED
CIRCLE-THROW
VIBRATION



TYLER-NIAGARA
SCRUBBER



TYPE 400
SCREEN



Improve Your Products and Increase Your Profits

. . . by using the following equipment:

THE TYLER-NIAGARA SCREEN—The ideal machine for coarse material, combining high capacity, reliability and low cost per ton!

TYPE 400 ELECTRIC SCREEN—Remarkable screening efficiency for difficult screening materials, especially in medium and finer sizes.

TYLER-NIAGARA SCRUBBER—Low power, low water consumption, thorough removal of silt and dirt.

TY-ROD SCREEN CLOTH—The extra long slot, high capacity screen.

TESTING EQUIPMENT—Will help you control screen and crusher performance and keep your product up to specification!

TYLER-HARMOR DRYER—Cuts drying, screening and grinding costs!

For further information see us at the Convention, or write:

The W. S. Tyler Company
Cleveland, Ohio

ER WIRE SCREEN

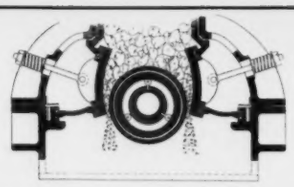
TYLER-HARMOR DRYER

TY-ROD SCREEI
(PATENTS PENDING)

TAP SIEVE SHAKER

IN BINDING

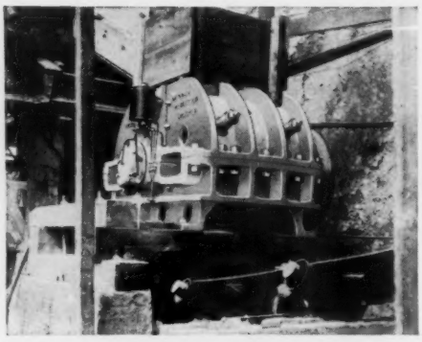
BONNOT—the Crusher that *does more and costs less*



Higher output from continuous crushing action without idle or back strokes. Minimum oversize and small circulating load.

Lower costs due to rugged construction, fewer parts and even distribution of wear. Power savings, 50% or more as shown by field tests.

The Bonnot is not a roll crusher, and it has no troublesome gears, countershafts or eccentric sleeves. The **slow creep mantle** is a revolutionary advance in crusher design.



Manufactured under U. S Patent No. 1,946,763

Write for Bulletin No. 60

BONNOT FEATURES

1. Utmost simplicity
2. Unusual ruggedness
3. Lowest headroom
4. Superior lubrication
5. Minimum choking
6. Extra long life
7. Lowest Upkeep costs
8. Safety plus
9. Big quality tonnage
10. Real power savings

CRUSHERS
HAMMER MILLS
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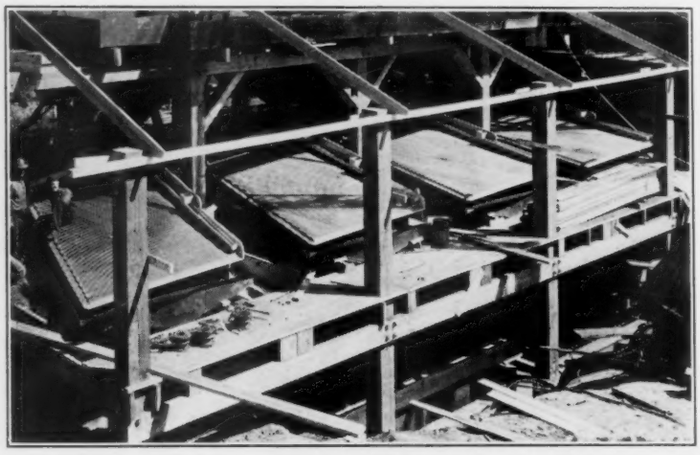
ROTARY KILNS
DISC FEEDERS

THE BONNOT COMPANY

CANTON, OHIO

New York Office: 30 Church St., New York, N. Y.

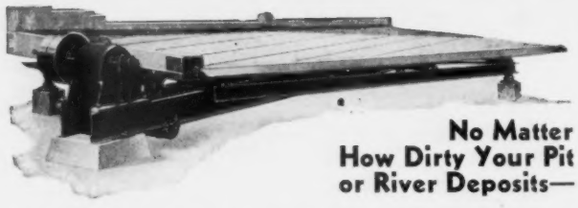
BUILDERS OF REDUCTION MACHINERY SINCE 1891



THE Leahy HEAVY DUTY VIBRATING SCREEN

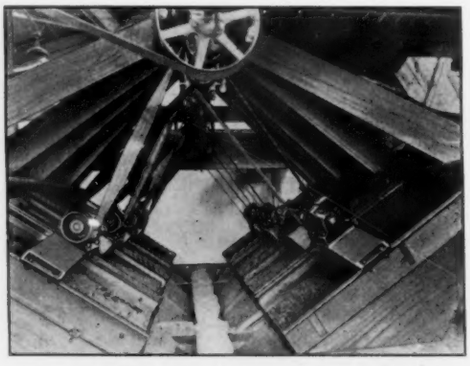
One large company operating nineteen plants—all Leahy equipped—says the following regarding the Leahy Screen: "We have standardized on this screen because we have been able to rely upon it for economical, dependable, and satisfactory service."

D-O SAND & GRAVEL WASHING TABLE

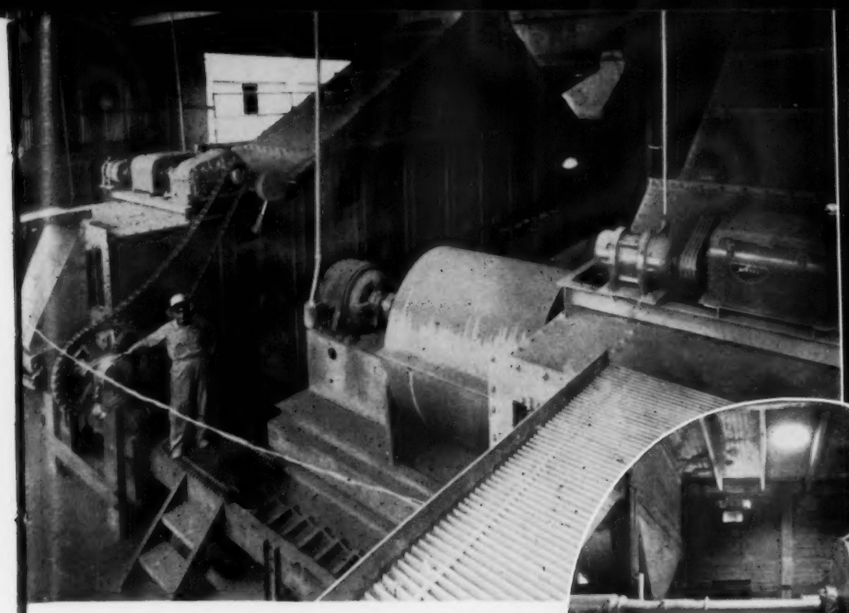


No Matter How Dirty Your Pit or River Deposits—

The Deister Overstrom Diagonal Deck Sand and Gravel Washing Table efficiently removes coal, sticks, clay, debris and contamination from dirty sand and gravel, producing a premium product. Capacity runs 20 to 45 tons per hour depending on size of material treated. Handles fine sand up to 2" gravel.

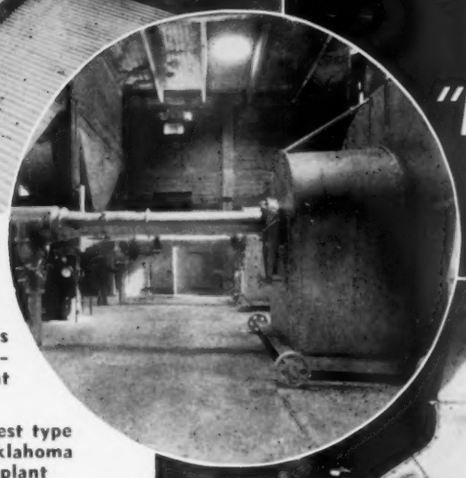


THE DEISTER CONCENTRATOR CO.
911 Glasgow Ave. Ft. Wayne, Ind.
Incorporated 1906
New York Office, 104 Pearl St., New York

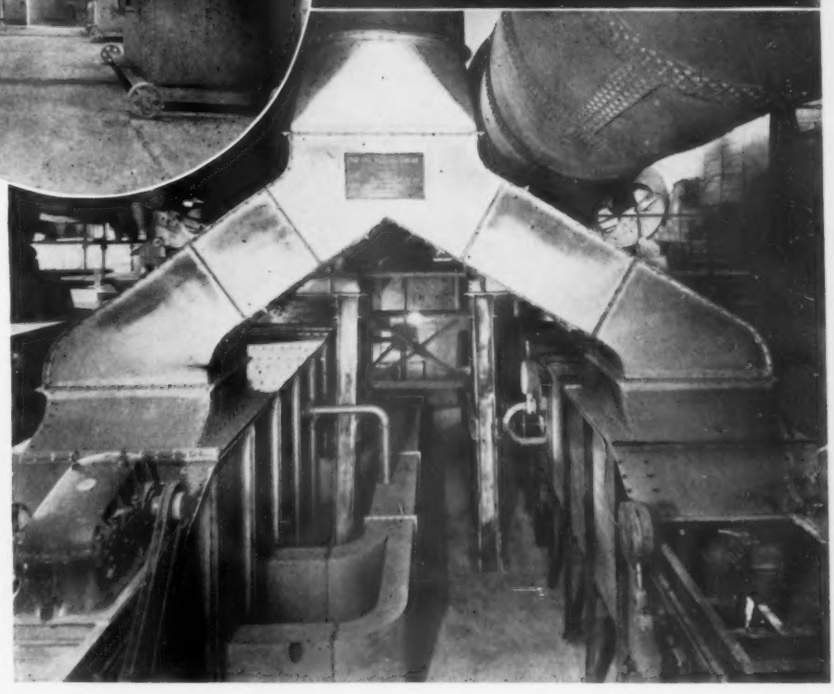


What Lee Coolers Do For Cement Plants

"Built on Principle"



Looking down at coolers from discharge end—Oklahoma Portland Cement plant



Firing floor, with latest type mixer and burner. Oklahoma Portland Cement plant

Twin installation of San Antonio Portland Cement Co.

1 Cut Fuel Costs

Compiled from actual operating conditions. 350 feet of gas per barrel of 1,050 B.T.U. gas equal to 367,500 B.T.U.s.

2 Increase Kiln Capacity

Two 10 ft. x 9 ft. x 220 ft. kilns with 42% moisture in slurry formerly produced 1,350 barrels, now are producing 1,500 barrels per 24 hours.

One hundred foot kilns formerly producing 41.66 barrels per hour are now producing 53.5 barrels per hour.

3 Improve Clinker Grindability

Due to the crystalline structure changes grindability has been increased 30%.

4 Low Maintenance

The total lost time on machines installed three years ago and continuously operated was fifteen hours per cooler for the entire year and an actual cost of $.0009 per barrel including labor and materials.

[Send for More Information Today]

Investigate—and you will install LEE COOLERS

CEMENT MILL EQUIPMENT CO.,

Engineers, Founders, Machinists

2842 West Grand Blvd. **DETROIT, MICHIGAN**

WHIZZER EQUIPPED ROLLER MILL 1933

FLASH DRYING SYSTEM 1934

KILN MILLS 1925

SUPER ROLLER MILLS 1923

PNEUMATIC FEED CONTROL 1915

AIR SEPARATION 1887

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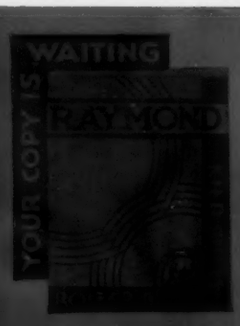
FORTY-EIGHT YEARS of progress in the development of pulverizing machinery—marked by major advances in design, construction and control—all contributing to better products, cheaper methods and more efficient operation.

This record of Raymond service to industry is your assurance of more profitable production of powdered materials *when you use Raymond mills.* The high spots in Raymond history, here shown, indicate a breadth of engineering experience that covers practically every problem in grinding, drying, separating and dust collecting.

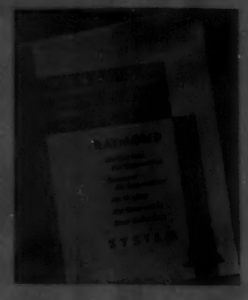
Today, Raymond equipment is built in capacities from one to forty tons per hour—with range of classification from granular material to micron material, testing 99.9% through 400-mesh—and with the flash drying system for removing moisture up to 85% content.

For details of these processes, write for catalog of equipment in which you are interested.



ROLLER MILL CATALOG
Super Mills, Midget Mills and Kiln Mills

PULVERIZER CATALOG
Hammer-type Kiln Mills, Impact Pulverizers and Screen Mills



SEPARATOR CATALOG
Whizzer Separators, Vacuum Separators, Dust Collecting Systems

KILN MILL BULLETIN
For pulverizing and drying, calcining, cooling and sulphur grinding

ORIGINATORS OF AIR SEPARATION
PIONEERS OF PULVERIZING
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RAYMOND BROS. IMPACT PULVERIZER CO.
1321 North Branch Street CHICAGO

Sales offices in New York and Los Angeles
Canadian Representative: Combustion Engineering Corporation, Ltd., Dominion Square Bui.ding, Montreal

VOLUME 27 NUMBER 7

Pit and Quarry

With which is consolidated
CEMENT-MILL & QUARRY
CHICAGO, JANUARY, 1935

Associations Ready for 1935 Gathering

MEET IN CHICAGO JAN. 28-31

Annual conventions of the National Crushed Stove Assn., National Sand & Gravel Assn., National Slag Assn., and the National Ready Mixed Concrete Assn., will be held January 28-31 at the Palmer House, Chicago. The joint machinery exhibition will also be held, after being discontinued last year. What each day holds in store for producers is summarized below:

Monday, January 28. The Code Authority for the crushed stone, sand-and-gravel, and slag industries will meet and organize itself to function during 1935. On the same day, at 5 o'clock, the Joint Exposition of the Manufacturers' Divisions of the National Crushed Stone Assn. and the National Sand & Gravel Assn., will be opened, with an "open house" in Exposition Hall, at which the manufacturers will be hosts.

Tuesday, January 29. Joint meeting of the crushed stone, sand and gravel, and slag industries for the purpose of discussing the Code in its entirety. This should prove to be an intensely interesting session.

Wednesday, January 30. The crushed stone association will hear speakers on crushed-stone problems. The morning session will be devoted to business and the opening address will be delivered by Pres. Russell Rarey. Reports by the directors, treating of the business conditions during the past year and the outlook for the coming year, will follow. Next will be the report by the Secretary and a report by the Director of the Bureau of Engineering in which the research work of the association will be discussed in sufficient detail to point out the nature of the results obtained and their value to producers. The Nominating, Auditing, and Resolutions Committees will also report at this session.

In the afternoon there will be some interesting papers. One of these will be delivered by a prominent engineer assigned by the U. S. Bureau of Public Roads and he will discuss "Trends in Highway Design and Construction." "Advanced Methods for Bituminous Road Surfacing" will be discussed by a well-known engineer from the Ohio State Highway Dept. "The Effect of Freight Rates on Rail Transportation of Commercial Aggregates" is the subject of still another paper which holds much of value because of the trends in aggregate production which are clearly shown.

On Wednesday, the National Sand & Gravel Assn. will also hold a separate meeting. Sand-and-gravel men will be addressed by the officers of the association, the report of the Board of Directors will be received and acted upon, and a report on business conditions in every part of the country presented by those previously assigned the task of developing this information. The program for the rest of this day will be devoted to discussions bearing upon problems which are vital to every producer of sand and gravel: The use of sand and gravel in bituminous construction; the use of sand and gravel in the so-called stabilized road; and the use of sand and gravel in concrete construction.

Thursday, January 31. Thursday morning is set aside especially to permit all producers to give their undivided attention to an inspection of the Joint Exposition. At 9:30 a.m. there will be an open meeting of the Division Committee for Industrial Sands. That Committee is given the right, under the Code, to prepare such supplemental provisions as will make the Code even more effective to the industrial-sand producers, and one of the items on the program at this Thursday morning meeting will be that of formulating a definite program for bringing to the industrial-sand industry more substantial code advantages during the coming year. At 2:00 p.m. the National Sand & Gravel Assn. will go into joint session with the National Crushed Stone Assn. and the National Slag Assn. and will hear three addresses bearing upon intensely interesting subjects at this point in the development of the recovery program. There will be three speakers of national prominence who will discuss the recovery program and the point of view of American business toward current events. Also on this program will be a film produced under the auspices of the New York State Highway Users Conference, entitled "The Road Ahead." On Thursday evening there will be a joint banquet of the crushed stone, sand and gravel, and slag industries held under the auspices of the three associations. At this time the annual presentation of safety awards will take place, the trophies being awarded by Dr. John W. Finch, Director of the U. S. Bureau of Mines. The principal speaker at the banquet will be Col. W. T. Chevalier, whose inspiring address at the Cincinnati meeting in 1934 is well remembered by all who heard it.

Programs of the National Stag Assn. and the Ready-Mixed Concrete Assn. are not available at this date.

Los Angeles Purchases 5,000,000 Bbl. Cement

The board of directors of the Los Angeles water district has authorized the purchase of 5,000,000 barrels of cement for a total price of approximately $7,000,000. It was said to be the largest order of its kind ever placed.

The cement contract, awarded on the basis of a bid of $1.40 a barrel, reported to be nine cents a barrel less than the price paid by the government on Boulder dam construction, was awarded jointly to the California Portland Cement Co., the Monolith-Portland Cement Co., the Riverside Portland Cement Co. and the Southwestern Portland Cement Co.

W. P. McDonald Will Head Road Builders

CONVENTION HELD AT CAPITAL

William P. McDonald, president of a large construction company in New York City that bears his name, is expected to succeed Capt. H. C. Whitehurst, Director of Highways of the District of Columbia, as President of the American Road Builders' Assn.

Officers will be elected at the 32nd annual convention and highway exhibit of the organization in Washington January 22-25, inclusive.

Mr. McDonald, together with a slate of other proposed officers, has been nominated by a committee appointed for that purpose at last year's convention. The other nominees are: Vice-presidents: Paul B. Reinhold of Pittsburgh, Pa.; George Pou of Raleigh, N. C.; Grover C. Dillman of Grand Rapids, Mich.; and Stanley Abel of Taft, Cal. Treasurer: James H. MacDonald of New Haven, Conn.

Directors for term ending 1938—Edward Costigan of Washington, D. C.; Arthur W. Dean of Boston, Mass.; Frederick Hoitt of Boston, Mass.; Charles T. Hvass of New York City; T. S. O'Connell of Phoenix, Ariz.; Thomas S. Stephenson of Altoona, Pa.; and Charles M. Upham of Washington, D. C., who is the Engineer-Director of the Association.

Officers also have been nominated for the City and County Officials' Divisions of the organization. In the City Officials' Division, the nominations follow:

President: Dudley T. Corning of Philadelphia, Pa.

Vice-presidents: Nathan L. Smith of Baltimore, Md.; W. E. Sheddan of Jacksonville, Fla.; Grover C. Dillman of Grand Rapids, Mich.; and Harvey W. Hincks of Pasadena, Cal.

Illinois Producer Wins Damages from Utility

The Byron Sand & Stone Co., Byron, Ill., was recently awarded a verdict for $10,375 damages against the Illinois Northern Utilities Co. The Byron company operated a gravel plant at Oregon, Ill., and claimed the utility company cut off the electric power in 1932, causing the closing of the plant.

Cowell Directed to Get Dust Arrestors

DECISION RENDERED BY COURT

In a 15-page decision covering all phases of the litigation, Judge Donald Geary of Santa Rosa, Cal., has decided the long-contested Cowell Portland Cement Co. dust case.

Judge Geary has ordered the company to reduce dust emanations by 85 per cent. Failure to do this will mean that an injunction will be granted, which will virtually force the plant to close.

The court's decision declares that the company must agree to this reduction within 30 days from the date of filing the decision or the injunction will issue.

In the event that such agreement is made the court will withhold action pending the installation of dust arrestors and will give the company ample time for the completion of this work. In the event that the work is delayed, however, the court directs that the company must cease operation between the months of May and November, the period complained of by the plaintiffs as having the greatest effect in damaging their crops.

The suit for injunction was brought against the Cowell concern by fourteen landowners who alleged that dust from the plant was ruining their crops and lands.

Mining Engineers Meet at N. Y. February 18-21

The American Institute of Mining and Metallurgical Engineers will hold its annual meeting, the 144th on record, February 18-21, at New York. Sessions will be held in the Engineering Societies Bldg., 29 West 39th St.

A number of the meetings will be of interest to producers of nonmetallic minerals. One of the important papers to be delivered is by C. E. Abbott which will describe one of the most unusual limestone mines in operation. Another session will hear a discussion on the flotation of limestone for cement manufacture.

Fire Razes Stone Plant in Idaho; Loss $40,000

The stone crushing plant of Carl O. Nyberg of Spokane, Wash., located in Cottonwood, Idaho, is reported to have been completely destroyed by fire at a loss of about $40,000.

Universal Atlas Plants Accident-Free in 1934

The Bluffington, Ind., plant of the Universal Atlas Cement Co., completed 1934 without a disabling injury to any of its people, according to an announcement made today by Gordon C. Huth, manager of the company's bureau of safety. It established a new record by completing an accident-free year for the first time in its history. Other Universal Atlas plants which had unmarred safety records for 1934 are located at Duluth, Minn., and Pittsburgh, Pa. By bringing 1934 to a close without occupational injuries the Buffington plant won the Portland Cement Association trophy awarded annually to plants having a perfect no-accident score. The Duluth plant is a four-time winner of this trophy, and the Pittsburgh plant has now accomplished the feat six times. On Jan. 1 the Buffington plant had gone 686 days without an accident, while Duluth had established a clear record for 1,436 days and Pittsburgh was close behind with a 1,335-day record.

G. B. Wood Is Permanent Receiver for Lime Corp.

Judge John A. Peters of the United States District Court recently appointed George B. Wood, president and general manager of the Rockland & Rockport Lime Corp., Rockland Maine, as permanent receiver for the company. Mr. Wood had been serving as temporary receiver.

Granite-Finishing Plant to Be Rebuilt After Fire

The Dakota Granite Works, Milbank, S. D., reports that it will immediately rebuild its finishing plant which was recently damaged by fire to the extent of $30,000.

PWA Spent $144,577,049 for Materials in Year

A total of $144,577,049 worth of nonmetallic minerals was purchased in the first year of P.W.A. work, according to figures just released. Cement, as the table below indicates, accounted for the greatest expenditure for a single material, with sand and gravel and crushed stone next in order.

NONMETALLIC MINERALS AND THEIR PRODUCTS PURCHASED FOR PUBLIC-WORKS PROJECTS IN 1933 AND 1934

Material	Month Ended Oct. 15, 1934	Previous Total (12 Months) to Sept. 15, 1934	Total (13 Months) From Beginning to Oct. 15, 1934
Cement	$8,989,115	$60,603,504	$69,592,619
Sand and gravel	4,169,458	32,945,299	37,114,757
Crushed stone	2,030,067	19,577,643	21,607,710
Marble, granite, slate and other stone products	1,390,851	6,837,018	8,227,869
Lime	18,733	115,400	134,133
Clay products	992,327	5,719,817	6,712,144
Concrete products	1,000,343	7,446,364	8,446,707
Glass	32,926	307,379	340,305
Paving materials and mixtures	921,526	8,556,281	9,477,807
Roofing, asphalt shingles, etc.	120,385	1,327,646	1,448,031
Wall plaster, wall board, etc.	153,798	992,207	1,146,005
Asbestos	2,862	52,694	55,556
Minerals and earth	1,894	95,797	97,691
	$19,824,285	$144,577,049	$164,401,334

Gas-Tax Collections Reach Peak in 1934

ESTIMATED YIELD IS $730,000,000

America's gasoline tax bill set a new high record in 1934 at $730,000,000, the American Petroleum Industries Committee has reported.

State gasoline-tax collections were estimated by this authority at $560,000,000, a new high record, while the Federal tax bill amounted to $170,000,000. The estimate did not include county and municipal taxes.

The grand total of taxes collected from motorists since the first tax—imposed by Oregon in 1919 to finance highway construction—rose to $4,152,423,281 last year. State collections exceeded 1933 figures by nearly $42,000,000, while Federal collection declined only $11,000,000, despite a reduction in the Federal tax rate of ½ c. a gallon on Jan. 1, 1934.

New York took first place in tax collections last year with a total of $43,750,000, compared with $43,344,695 in 1933. California was second with $35,780,000, against $35,217,162, and Pennsylvania third with $32,890,000, compared with $30,739,117 in 1933.

Huron to Supply Cement for Government Building

Contract for cement to be used in government construction in the Grand Haven, Mich., harbor has been awarded to the Huron Portland Cement Co., operators of a new floating plant and distributing headquarters on the Bauknecht dock, Muskegon, since last June. It is reported to be planning the erection, in the near future, of concrete silos and an office structure to comprise a permanent Muskegon branch. The Grand Haven project will be serviced from the Muskegon plant.

Installs Bin Indicators at Cement Plant in Iowa

★ The Northwestern States Portland Cement Co., Mason City, Ia., has installed Bin-Dicators, devices for indicating the level of material in bins, made by the Ripley Manufacturing Co., Wayne, Mich.

Adds Long Conveyor to Allow Shipment by Rail

★ The Hornell Sand & Gravel Co., has installed a long conveyor at its plant at Cohocton, N. Y., so that shipments can now be made by rail. A spur line to the plant from the D. L. & W. Ry. has just been completed.

★ The Allen Granite Co., and the National Granite Co., are reported to be jointly building a large granite monumental finishing plant in Elberton, Ga., under the name of American Granite Quarries, Inc.

Tennessee Phosphate Producers Hail Boom

SOME ON 24-HOUR SCHEDULE

Phosphate-mining activities of private companies in the Maury County producing district have far surpassed T.V.A. phosphate activities in that section within the past few weeks, a survey reveals.

An average of fifty cars of rock is being shipped each day, which is near pre-depression levels, and employment of workers is constantly growing. Railroads have found it necessary within the past few months to put on extra freight trains to handle the rock movement.

T.V.A. expenditures, which now exceed $500 per day, are for the mining of raw rock, which is shipped to the experimental fertilizer plant at Muscle Shoals.

Expenditures of private companies in Maury County are estimated at around $5,000 per day.

Phosphate operators say that orders for rock are rapidly increasing, and that many companies which have been filling orders from storage will soon begin producing again.

The Federal Chemical Co. drying plant at Ripley, Tenn., is running day and night shifts, and the management expects to resume mining soon.

Charleston Mining & Manufacturing Co. is operating its Mt. Pleasant and Gordonsville, Tenn., plants on day and night shifts.

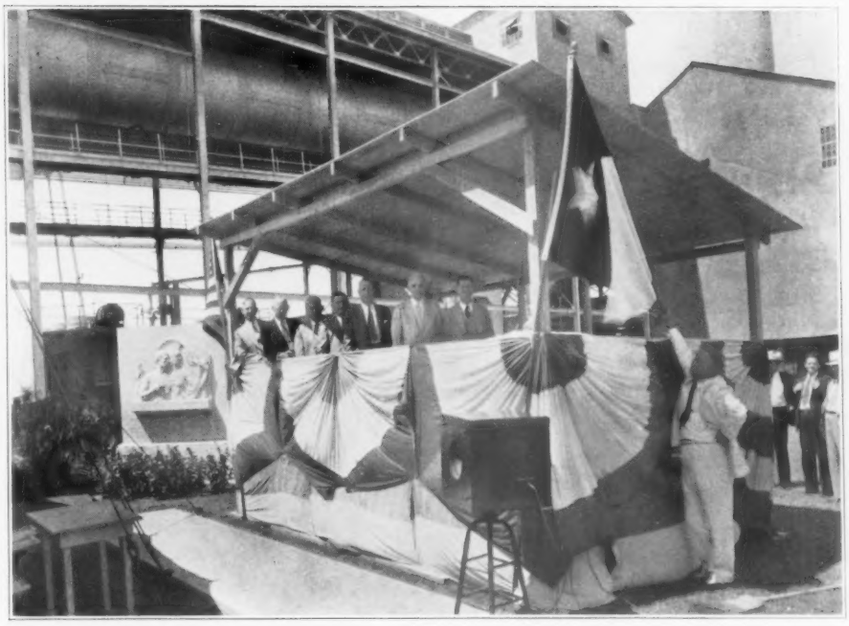
The Armour Fertilizer Co.'s plant near Ashwood, Tenn., is increasing its output and has recently resumed mining operations.

The International Agricultural Corp. is shipping large quantities of rock daily, and mining and processing activities are being expanded.

Blasts Open Up Quarry Ditch; Seepage Halted

The Mt. Rose Quarry, near the village of Middle Inlet, Marinette County, Wis., for years was confronted with the problem of seepage into its quarry which required almost constant pumping. This seepage was finally controlled by means of a blasted ditch which diverts the course of a creek draining a swamp adjacent to the quarry.

According to Carl L. Redeman, superintendent, efforts were first made to clear away the undergrowth and dig the ditch but it was found that about half the ditch would have to be made through an old corduroy logging road and that digging through the matted cedar stump roots would take too long and cost more than it would be worth. Dynamite then suggested itself and the ditch was put through in half a day, with three men and 300 lb. of du Pont ditching dynamite. When the ditch was finished it was about 200 yd. long, 6 feet wide and about 3 feet deep. Shortly after its completion, according to Mr. Redeman, seepage stopped entirely and no pumping was necessary.



Scene at the rededication of the safety trophy at Houston plant of Lone Star Cement Co., Texas, after the plant had completed more than three full years without an accident. Among those in the speakers' stand are Wm. Moeller, general superintendent; T. B. Warden, P. C. A. engineer; L. J. Wheeler, plant superintendent; and Mayor Holcombe of Houston.

Two Electric Shovels in New Cement-Mill Quarry

When the new Brodhead, Pa., plant of the National Portland Cement Co. begins operations in January, two P&H Model 1200 electric-drive machines will go into service supplying rock for the crushers.

Notable improvements have been made on these large machines during the past year in the interest of speeding up the digging cycle. The heavy generator units have been conveniently spaced and placed back of the center of rotation to act as a natural counterbalance for heavy loads and eliminate much of the deadweight ordinarily required. Tests show a resulting higher swing speed, and with total weight of the upper structure reduced, lower power consumption.

Acme Limestone Erects Administration Building

A modern $10,000 administration and store building is being built by the Acme Limestone Co. at its plant at Snowflake, W. Va. It is planned to move all the company's offices from Alderson to the new building.

California Plant Ships Order to South America

The Holmes Lime & Cement Co., Felton, Cal., recently completed shipment of a large order of products to one of the sugar companies at Acajutta el Salvador, Central America. The Felton plant also recently completed the construction of a new 250-ton bunker at the foot of its newly rebuilt tram. This was done under the supervision of W. E. Wechlo, the company's superintendent at Felton, creating employment for 10 additional men.

Drainage ditch at Mt. Rose quarry showing undergrowth which retarded flow of water.

Same ditch after explosives had solved the problem of "digging" up matted growth.

All Four Classes of Construction Decline

RESIDENTIAL LOSS FELT MOST

The construction-award figures for November exhibited a decline both as contrasted with data for October and with the figures for November of last year according to F. W. Dodge Corporation. Losses from the previous month were noted in each of the four principal classes of construction: about $9,000,000 in public works; $4,500,000 in non-residential buildings; $4,000,000 in public utilities; and more than $6,000,000 in residential buildings. This loss in residential building is the more discouraging because it occurred in that phase of construction where FHA aid has been chiefly centered. Declines in contracts from the data of a year ago were shown in residential buildings and public works of such size as to more than entirely offset the gains reported in non-residential buildings and public utility types. The November construction contract total, all classes, amounting to $111,740,800 in the 37 eastern states, was more than 30 per cent. behind the volume of $162,340,600 reported for November, 1933, and compares with $135,224,800 for October of this year.

For the elapsed eleven months of 1934 contracts for construction, all types, totaled $1,450,426,900 in the 37 states as compared with $1,048,498,900 for the corresponding months of 1933. Cumulative increases over 1933 were shown for each major construction classification: $187,000,000 in public works; $161,000,000 in non-residential buildings; $44,000,000 in public utility types; and only $9,000,000 in residential buildings. Commenting on the small gain in residential work the Dodge organization states:

"It must be remembered that the contract figures include both new and alteration projects. It is of interest, therefore, to note that on the side of residential building, the entire gain in contracts thus far reported for 1934 was due to alterations; but for this gain in alteration and modernization projects, the residential contract total for the eleven months of 1934 would have fallen behind the 1933 level by about $5,000,000."

U. S. Gypsum Victor in Ten-Year Patent Battle

Victory in a patent litigation suit has been accorded the United States Gypsum Co. in the Court of Appeals of the District of Columbia, according to announcement made at the Chicago offices of the company.

The patent involves the manufacture of cellular cementious materials, including gypsum. The patent application was made almost ten years ago. In the patent office it was contested by John A. Rice and the Bubblestone Co. of Pittsburgh, and by Erik Bayer and the Christiani and Nielsen Co. of Copenhagen, Denmark.

The patent office decided in favor of the United States Gypsum Co., but the patent could not be issued, because of suit brought by the contestants in the Supreme court of the District of Columbia. Decision there was in favor of United States Gypsum Co., whereupon the case was carried to the Court of Appeals, the court of last resort, where decision again was in favor of United States Gypsum.

A patent covering the invention, according to the announcement, now will be issued by the patent office.

Pick Regional Directors for Compliance Offices

Regional directors are being appointed in the nine N.R.A. compliance offices throughout the country. Offices are being set up in Boston, New York, Washington, Atlanta, Cleveland, Chicago, Omaha, Dallas, and San Francisco. Six of the nine regional directors already named are: W. L. Mitchell, Atlanta; Benedict Crowell, Cleveland; C. F. Rumely, Chicago; Ernest L. Tutt, Dallas; Donal Renshaw, San Francisco; and Merton Emerson, Boston.

Lima Stone Co. Sold to National Lime & Stone

The Lima Stone Co., with plant and offices at Lima, O., has been sold to the National Lime & Stone Co., of Findlay, O., which plans to continue operations under the present set-up. The price was reported to be $65,000. The acquisition gives the National company two producing units at Lima and seven others within the state.

Indiana Plant Resumes After Labor Difficulty

The Heltonville Limestone Co., Bedford, Ind., recently resumed operations following the signing of an agreement with the American Federation of Labor. Representatives of several mill workers' unions had charged the company with unfairness to organized labor and 200 pickets had prevented the operation of the mill.

California Gypsum Firm Adds to Working Force

The Standard Gypsum Co., operating at 1301 South Water St., Long Beach, Cal., is planning to double its staff, it is reported. The firm now manufactures hardwall plaster, fireproof and partition tile and wallboard. Several other gypsum products will be added to the line as soon as the necessary equipment is installed, according to Jack Hassell, supt.

Inland Quarry Closes After Active Season

119 VESSELS CLEARED PORT

The shipping season at Port Inland, Mich., the port of the Inland Lime & Stone Co., has closed, according to an announcement by A. J. Cayia, general superintendent.

During the 1934 season, a total of 119 vessels were loaded at Port Inland. Total shipments were about 950,000 tons of stone. Total shipments last season were approximately 860,000 tons, representing a gain of nearly 11 per cent. over last year.

With the cessation of shipping operations, employment at the Inland Lime & Stone Co. plant has been materially reduced for the winter season. An average of 240 men were on the payroll during the summer months, but the winter and early spring payroll is not expected to exceed 125 men, Mr. Cayia said. Work during the cold months will consist of drilling, blasting, maintenance of equipment and construction of additional dock storage facilities.

A remarkable record in safety has been established by the Inland Lime & Stone Co. during the past two years, according to records at the plant. As of November 18, the company operated two full years without a lost-time accident. This is largely due to the enlightened policy of the company in safety-first education and safety-first equipment.

In line with a policy followed last year, the Inland Lime & Stone Co. gave Christmas turkeys to all its employes again this year, Mr. Cayia reports.

Seek Production Control in Northwestern States

Establishment of production control for the aggregates industry in the Pacific Northwest was sought in a series of hearings held at Portland, Ore., the last week in December. Porter W. Yett, Code Authority chairman for Oregon, Washington, Idaho and Montana, presided at the hearings.

According to Mr. Yett, less than 10 per cent. of the producing capacity of the industry is being utilized in that area at present.

Road-Building Concern Acquires Indiana Plant

The sand-and-gravel business formerly conducted by the late Frank C. Jordan at Elkhart, Ind., has been purchased by the Brand & Deal Co., road-building firm of Columbia City, Ind. The new owners have started improving the production facilities on the property and are reported to be spending $15,000 in new equipment. Production will start about March 1, it is reported.

States Again Receive Federal Highway Aid

PRELIMINARY GRANTS LISTED

Apportionment of $125,000,000 for Federal aid to the States in highway construction in the fiscal year beginning July 1, 1935, marked the resumption of the old policy of Federal highway aid. The apportionment was made by Henry A. Wallace, Secretary of Agriculture, on December 27 under the authorization contained in the Hayden-Cartwright Act of June 18, 1934.

Secretary Wallace, in making the apportionment, called attention to the possibility of reduction of a state's apportionment through the operation of the provision in the Hayden-Cartwright Act relative to the diversion of gasoline taxes and other taxes on motorists. The act provides that Federal aid for a state's highways shall be reduced unless the State uses for highways at least the amounts provided by law on June 18, 1934, for that purpose from the state's gasoline and motor vehicle taxes and other special taxes on motor vehicle owners.

The apportionment is as follows:

State	Sum Apportioned
Alabama	$2,604,320
Arizona	1,781,347
Arkansas	2,142,723
California	4,756,959
Colorado	2,288,811
Connecticut	791,253
Delaware	609,375
Florida	1,655,723
Georgia	3,168,221
Hawaii	609,375
Idaho	1,531,162
Illinois	5,160,696
Indiana	3,087,613
Iowa	3,231,718
Kansas	2,317,054
Kentucky	2,304,143
Louisiana	1,776,939
Maine	1,090,167
Maryland	1,025,870
Massachusetts	1,741,877
Michigan	3,837,292
Minnesota	3,423,306
Mississippi	2,196,524
Missouri	3,800,856
Montana	2,560,449
Nebraska	2,581,663
Nevada	1,595,501
New Hampshire	609,375
New Jersey	1,675,751
New Mexico	1,999,299
New York	6,150,106
North Carolina	2,938,657
North Dakota	1,960,162
Ohio	4,565,435
Oklahoma	2,947,521
Oregon	2,044,633
Pennsylvania	5,348,062
Rhode Island	609,375
South Carolina	1,692,896
South Dakota	2,036,775
Tennessee	2,638,159
Texas	7,777,504
Utah	1,410,752
Vermont	609,375
Virginia	2,278,475
Washington	1,949,957
West Virginia	1,356,793
Wisconsin	3,045,557
Wyoming	1,559,444

Lyman-Richey Gravel Co. Effects Reorganization

Reorganization of the Lyman-Richey Sand & Gravel Co., of Omaha, Neb., has been authorized in Federal court at Omaha, the company having applied for permission to change its capital set-up under Section 77-B of the corporate-reorganization act, in an attempt to bring to the company liquid capital.

Two officials of the company, L. C. Curtis, general manager, and Fred P. Curtis, purchasing agent, were appointed trustees by the court, while G. Keyes Page of Kansas City, Mo., was named to effect the reorganization.

The Lyman-Richey company is one of the main factors in aggregates production in the Omaha area and throughout Nebraska. It owns and operates 22 plants, nine of these being close to Omaha. It also produces and sells ready-mixed concrete in Omaha.

New Machines Installed by Wisconsin Producer

★ Extensive improvements are being made at the plant of the Royal Granite Co. plant, located about six miles west of Mellen, Wis. New machinery is being installed to expedite the quarrying of the granite and increase the output of the quarry.

Navigation Co. Installs Bucket at Gravel Point

★ The Umpqua River Navigation Co. recently installed a new 3-cu.yd. Owens clamshell bucket at its gravel plant at Reedsport, Ore. The company has been continually enlarging its plant since receiving contracts for supplying gravel to the Siuslaw, Coos Bay and Umpqua bridges, and it expects to be active for considerably more than a year.

Chicago Producer Plans Waterway Loading Dock

The Chicago Gravel Co., Chicago, Ill., is completing plans for the construction of a loading dock and port on the deep waterway south of Joliet at an estimated expenditure of $100,000, according to reports. Site for the dock has already been purchased and preparations are under way for the laying of track from the company's wash plant on the Channahon Road to the river bed. The company has shipped its stone to Chicago and other cities by rail for many years. The change in the method of shipment will mean a great savings, as water freight is considerably cheaper.

Lays Rail Connection to Gravel Pit in Alabama

★ C. D. Carter of Sheffield, Ala., has taken over and reconditioned the gravel pit on the Woffard Estate, Golden, Miss. Approximately two miles of standard gage railroad track will be built connecting with the main line of the Illinois Central and a locomotive will be installed to haul the gravel to the junction.

Award Contracts for Pickwick Dam Cement

AGGREGATES ALSO ORDERED

Contracts for 750,000 bbl. of Portland cement for use in constructing the Pickwick Dam in Tennessee have been let to eight companies, according to an announcement from the T.V.A. purchasing offices at Knoxville, Tenn. The awards were divided as follows:

Alpha Portland Cement Co., Birmingham, Ala., 14 per cent; Cumberland Portland Cement Co., Cowan, Tenn., 5 per cent; Hermitage Portland Cement Co., Nashville, Tenn., 5 per cent; Lehigh Portland Cement Co., Allentown, Pa., 10 per cent; Lone Star Cement Co., Birmingham, Alabama, 15 per cent; Marquette Cement Mfg. Co., Chicago, 25 per cent; Universal Atlas Cement Co., Chicago, 15 per cent; and Pennsylvania-Dixie Cement Corp., Chattanooga, Tenn., 11 per cent.

A considerable quantity of aggregates for constructing the Pickwick, as well as the Joe Wheeler Dam, will be supplied by the Cumberland River Sand Co. of Nashville, Tenn. According to R. N. Coolidge, general manager of the Cumberland company, the firm has signed a contract with the T.V.A. to furnish between 1,000,000 and 1,400,000 tons of sand and gravel during 1935.

Region 11 Gathers to Name 1935 Committees

Members of Region 11 of the aggregates industry are scheduled to gather January 8 at the Nicollet Hotel, Minneapolis, to select a regional committee to serve during 1935. Operators in the Dakotas and Minnesota are included in the regional area. The call for the meeting was issued by W. W. Baker, executive secretary, who maintains offices for the regional committee in the Baker Bldg., Minneapolis.

Starts Working on Ohio Asphaltic-Rock Deposit

★ The Ohio Native Rock Asphalt Co. is reported to be developing a deposit of rock asphalt at Willettsville, near New Vienna, O. The company plans to work this deposit on a large scale and has already made a number of shipments.

Installs Classifiers to Reclaim Waste Material

★ The Modern Sand & Gravel Co., Pacific, Mo., recently installed two Wood Auto-Vortex classifiers to reclaim valuable products formerly wasted.

★ The Lehigh Portland Cement Co., Allentown, Pa., recently installed three 14-ft. Sturtevant separators in its plant at Iola, Kans.

Editorials

The Supreme Court and the N. R. A.

IT is amusing to observe the readiness with which opponents of what is generally known as the "new deal" seize upon the smallest and least valuable evidences of what they declare to be the "collapse," the "disintegration" or the "failure" of the present administration's program of social and economic improvement. The cry of exultation with which many of them greeted the decision of the United States Supreme Court in the case dealing with the President's authority to control oil production indicates how completely the mind can become dominated by the wishful thinking born of deep-seated prejudices.

We hope that no man whose business is being operated under code supervision or whose commercial opportunities are affected favorably or unfavorably by the activities of various "new deal" agencies will fail to make a study of the Supreme Court's decision. If he secretly longs for the "collapse" of present-day socio-economic control and expects to find its death-knell sounded therein, he will be quickly and beneficently disillusioned. If he is hopeful of finding in it any encouragement for confidence in a return to the so-called "free" competition—or, more properly, the chiseling individualism —of former years, he will lay the document down with a feeling of keen dissatisfaction. If he expects to learn in what way it will affect his own business, he will come away unenlightened. For aside from its opinion concerning Section 9 (C) of the National Industrial Recovery Act, the court offers no comment on any of the provisions of the act nor on its constitutionality in general, it raises no question of the legality of any of the activities inaugurated under those provisions. And that section, in the words of the court's opinion, "is brief and unambiguous." It "purports to authorize the President to pass a prohibitory law. The subject to which this authority relates is defined. It is the transportation in interstate and foreign commerce of petroleum and petroleum products which are produced or withdrawn from storage in excess of the amount permitted by state authority." The Court's only objection to Section 9 (C) rested on the failure of Congress to declare a policy "as to the transportation of the excess production." "The Congress did not prohibit that transportation," says the opinion. "The Congress did not undertake to say that the transportation of 'hot' oil was injurious. The Congress did not say that transportation of that oil was 'unfair competition.' The Congress did not declare in what circumstances that transportation should be forbidden, or require the President to make any determination as to any facts or circumstances."

On the general subject of the delegation of powers by the Congress, however, the opinion says:

"Undoubtedly legislation must often be adapted to complex conditions involving a host of details with which the national legislature can not deal directly. The constitution has never been regarded as denying to the Congress the necessary resources or flexibility and practicality, which will enable it to perform its function in laying down policies and establishing standards, while leaving to selected instrumentalities the making of subordinate rules within prescribed limits and the determination of facts to which the policy declared by the legislature is to apply. Without capacity to give authorizations of this sort we should have the anomaly of a legislative power which in many circumstances calling for its exertion would be but a futility."

This is not only sound law but good sense; it has the support of precedent and of reason. If the foes of social, political and economic progress, as this is provided for in the administration's general policies, can find any consolation or encouragement for their views in such declarations, they make use of strange critical standards and deceive themselves unduly.

Economic Reciprocity in Illinois

IF anyone thinks that the experiences of recent years have taught us the truth of our economic interdependence, let him turn his eyes for a moment in the direction of Illinois, a state noted for many qualities other than political and economic good sense. He will discover there, in the recent action of Governor Horner and the Southern Illinois Reciprocal Trade Association, illuminating evidence of the tenacity of the time-worn ideas of sectionalism, modernized and applied to the social and business problems of this post-depression period.

Incredible as it may appear, it is nevertheless true that the governor of Illinois has notified the state's highway department that hereafter only cement produced with Illinois coal shall be bought for use in building Illinois highways. This action has had the result of forcing an Iowa cement manufacturer to abandon the use of natural gas as fuel in favor of Illinois coal, 80,000 tons of which, it is said, will be delivered within a year.

The purpose back of this drive for selling Illinois coal is laudable enough as purposes go. The object, according to the Illinois trade association, is the reemployment of unemployed southern Illinois coal miners. When it was discovered, due to the efforts of this organization, that cement produced with natural gas was used in highways traversing the coal-mining regions, all the natural resentment born of sectional selfishness asserted itself in favor of Illinois coal. The governor's action followed.

The results, according to the association's managing director, J. W. Bristow, will be $120,000 in wages for the miners during the year and $168,000 in railroad revenues, of which it is estimated that one-half will go to labor. But "this is just a beginning," says Mr. Bristow. "Two other cement companies depending for sales upon Illinois territory must abandon natural gas if they expect to do a profitable business in Illinois. When these two companies come in, we will have increased the normal market for Illinois coal by a total of 300,000 tons which will mean an increase of $600,000 annually in mine and railroad pay-rolls and a total increase of $530,000 in railroad revenues." The production of the state's cement requirements of 2,500,000 barrels will require 250,000 tons of coal, as he figures it, meaning $500,000 immediately to labor and $425,000 to the railroads.

Naturally, Mr. Bristow is not interested in the equities in the case nor in its legal aspects. That workers employed in the supplying of natural gas should be thrown out of employment by his pretty scheme of "Illinois for Illinoisans" is no concern of his, nor that the localities in which these men live should be forced to contribute to their sustenance while unemployed. Mr. Bristow's vision extends precisely to, and no farther than, the limits of his own bailiwick, and as long as he can defend a job for himself in southern Illinois why should he be troubled by the economic problems of the gas-producing regions? The seeds of social and economic interdependence bring forth no fruit when planted in his intellectual garden of regional self-sufficiency.

We seriously question the legality of the action taken by the governor in forbidding the use of cement not made with Illinois coal. On the face of it this appears to be an unwarranted assumption by the executive of legislative powers, since the purchase of cement not made with Illinois coal has not yet, as far as we are able to learn, been made unlawful in that state. The state's laws require the purchase of materials that meet the state's specification requirements regarding quality and from the lowest bidder able to furnish them and they do not give the governor or any other administrative official the right to disqualify any bidder on account of the sources from which he obtains the materials or supplies that enter into his production processes. In our judgment this constitutes a usurpation of power in the control of business that is as unwarranted legally as it is indefensible economically.

It is true that unemployment is a serious problem, but we see no merit in a purported solution that merely succeeds in shifting the burden from one locality to another. In our attempts to restore national economic well-being we can not hope to succeed unless we obliterate in our planning and in our actions the lines which separate one political subdivision from another, for the problem transcends sectional boundaries and the remedies must be equally broad in conception and application. Responsibilities can be discharged only by accepting them, not by shifting them, and Mr. Bristow's cleverly-conceived plan for helping southern Illinois is not a sound program. He may gain temporary relief for his district, which even though it may not be a permanent gain is still a worthy objective, but he would do so at the expense of other districts and on no more defensible ground than that of expediency. We doubt whether other sections of Illinois will agree to the principle of his plan, if other states should decide to adopt it with respect to products which they buy from Illinois producers.

Progress During Depression

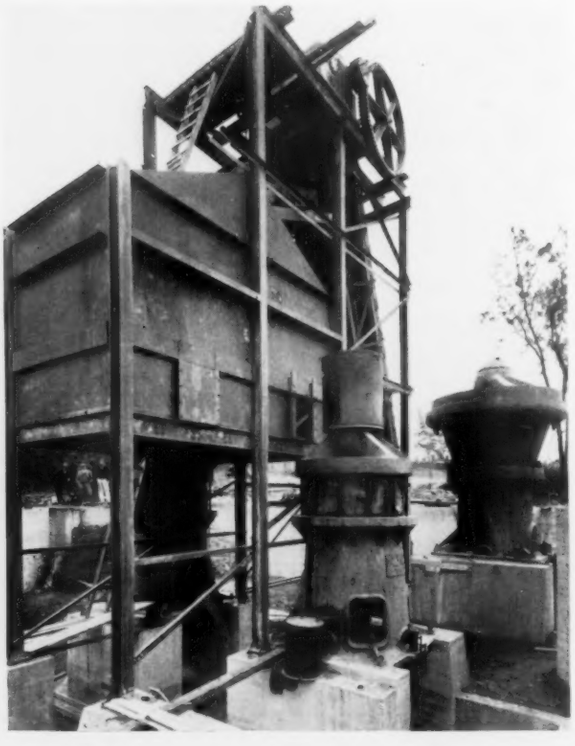
MOST people probably look upon periods of business depression as times of stifled activity in which the march of progress is not only slowed but actually stopped. Of course, this is true of only few forms of activity and it certainly is not true of our industries. The five years just closed have been an era of spiritual as well as economic depression and it has often seemed that the normal processes of modern life, particularly as they are manifested in industrial activity, were at a standstill. In our own industries the complaints of inactivity have been frequently made, both by producers themselves because they suffered from a lack of orders to sustain consistent production and by those who sell equipment and supplies for the carrying on of their production processes, but they have been based too often on limited information respecting specific localities and on the necessarily restricted viewpoint of individual observers.

In this issue we have brought together some of the many evidences of activity in the nonmetallic-mineral industries in the last half-decade. Although it is obviously and unavoidably incomplete, because of the impossibility of compressing into a few pages a report of all the developments that occurred in a large field even in the last five years, the story provides enough evidence of the forward movement of production methods and production facilities to convince the most skeptical of the continuous, even though retarded, advance that has characterized these industries.

The showing, despite its lack of completeness, will be astonishing to everyone not intimately familiar with conditions. It discloses the sure faith in the future of these industries which has animated most of the men engaged in them and has led them to expend millions of dollars for technological betterments when the outlook for improved business was gloomy indeed. It demonstrates the fact that no industry which is basically sound can fail to advance in the face of the most discouraging and trying obstacles. The record is one of which the industry can feel justly proud, and it should prove heartening to those whose faith may at times have wavered.

Four construction views of the new plant of the National Portland Cement Co. at Brodhead, Pa., which is near completion. Above are the concrete storage-silos with kiln stacks in background. Below is the crushing plant with primary and secondary gyratory crushers, bucket-elevator and storage-bins.

Above are the two rotary kilns. Below is a shovel opening up the quarry with kiln building and stacks in background.



Survey Reveals 1930-1934 Period Was One of Advance in Cement Field

THE cement industry of the United States is entering the year 1935 with a spirit of optimism which has not been in evidence for many years. At the recent meeting of the Portland Cement Assn. in Chicago producers were unanimously of the opinion that 1935 would definitely mark the return of the industry to a profit-making basis. Financial reports disclose that many companies were able to show profits in 1934.

In 1934 the industry spent more money for new plant construction and the improvement of existing plants and facilities than in any of the several preceding years. One new plant was erected during 1934, although it will not be in operation for several months. This is the first new cement plant built since 1929, in which year nine were constructed. This renewed activity is due largely to the increase in production in 1934 and to the better prices obtained in both 1933 and 1934.

A cheering note was the abandonment during this period of a number of obsolete privately-owned plants and of the Michigan State cement plant which was sold for junk in 1934. Only one state-owned plant is now in operation.

The cement industry in 1934 experienced the first increase in production since 1928. Production decreased from 176,298,846 bbl. in 1928 to 63,473,189 bbl. in 1933. Complete figures for 1934 are not yet available but the first eleven months showed an increase of about 22.4 per cent. in production and of about 20.6 per cent. in shipments over 1933.

From a strictly technical standpoint the depression was responsible for a healthier condition in the industry. When business was booming producers centered their attention and spent their money largely for expansion of productive capacity. The total annual capacity of the industry, which had been increasing rapidly for many years, was estimated at 258,917,000 bbl. in 1929. In 1931 it reached 271,850,000 bbl. but in 1932 started to decrease slowly until it reached 269,387,000 bbl. in 1933. The percentage of capacity utilized dropped from 65.9 per cent. in 1929 to 23.6 per cent. in 1933.

The very conditions which discouraged the building of new plants were responsible for the concentration by producers on the improvement of existing plants in order to obtain higher efficiency and greater economy of operation. As a result most producers are now in a position to profit by any further improvements in demand and prices.

The most important cement-industry development of 1934 was the erection of the plant of the National Portland Cement Co. at Brodhead, Northampton County, Pa. This plant, the first complete cement plant to be built in this country since 1929, is rapidly nearing completion and is expected to be in full operation early in 1935. Its initial capacity will be 3,600 bbl. daily, but it is so designed that this capacity can be doubled or trebled at any time. It is a wet-process plant and is notable particularly for the simplicity and compactness of its design which was attained without sacrificing flexibility. Only eleven major units are required in the rock-crushing, raw-grinding, clinker-grinding, coal-grinding, and kiln departments.

In the quarry two P&H 2-cu.yd. electric shovels equipped with Ward Leonard control load the rock into Atlas 10-ton quarry cars. These are hauled to the plant by a Vulcan 12-ton gasoline locomotive and are "spotted" by an electric hoist of the same make. The crushing equipment consists of Kennedy-Van Saun primary and secondary gyratory units. Jeffrey belt-conveyors take the crushed stone to the storage building, where clinker and coal are also stored. A P&H 3-cu.yd. overhead traveling crane serves the entire building.

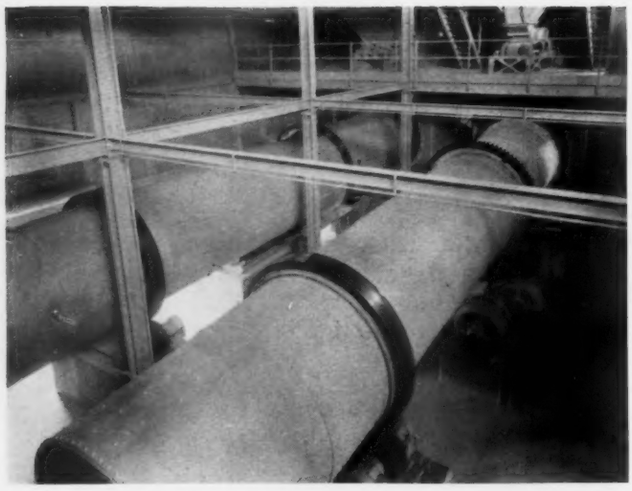
Raw grinding will be done by two F. L. Smidth Unidan mills and finish grinding by two similar units, all being driven by high-speed motors connected to Smidth Symetro gears and all operating in closed-circuit. Slurry is agitated by Smidth combination air and mechanical mixers, including a 17,000-bbl. slurry storage-basin fitted with a traveling agitator. Wilfley pumps handle the slurry.

The two Smidth Unax kilns are 10 ft. in diameter and 372 ft. long and are equipped with 10-cell single-row Unax coolers. These kilns are equipped with the latest control and regulating devices including induced-draft fans. The two concrete kiln stacks, erected by the Alphonse Custodis Chimney Co., are 180 ft. high and have independent brick linings. Coal is crushed by a Jeffrey hammer-mill before being sent to storage, after which it is pulverized in Smidth Unidan mills fitted with compartments for drying it.

Cement is transported from the finish-grinding mills to storage by Smidth Fluxo pumps. The storage consists of 25 silos 85 ft. high having a capacity of 250,000 bbl. Cement is reclaimed from the silos by mounted Fuller-Kinyon pumps which deliver it to the pack-house, air for these pumps being supplied by Fuller rotary air-compressors. Smidth Fluxo packers put the cement in sacks.

The plant was designed and is being constructed under the personal supervision of Fred B. Franks, vice-president and general manager of the National company. A. P. Hachtmann is chief engineer in charge of details in connection with construction.

The M. A. Long Co., engineer and contractor, of Allentown, Pa., and Baltimore, Md., has the general contract covering the construction of all buildings and foundations, and the design and preparation



Two rotary driers used in the preparation of raw materials in the plant of the Alpha Portland Cement Co., Cementon, N. Y.

of all construction drawings, except those for the shop building.

F. L. Smidth & Co. furnished most of the equipment for the plant including kilns, coolers, raw-material, clinker and coal-grinding mills, Skipulters, air-separators, slurry and clay agitators, clay wash-mill, bag-packers and a cement-transport system. The Kennedy-Van Saun Manufacturing & Engineering Corp. supplied all the equipment for the crusher building, including feeders, primary and secondary crushers, screens, etc. The Fuller Co. supplied a cement-transport system and rotary air-compressors. The Link-Belt Co. supplied the coal, clinker, cement and gypsum elevators and the Jeffrey Manufacturing Co. the coal track-hopper, conveyor and crusher. All the motors and other electrical equipment were supplied by the Westinghouse Electric & Manufacturing Co. Wilfley pumps handle the clay slip and slurry and Worthington pumps the water required by the plant. The Harnischfeger Corp. supplied the two quarry shovels and an overhead traveling crane. Dust-collecting equipment was put in by the Northern Blower Co.

The two shaker-type clinker coolers in the plant of the Alpha Portland Cement Co., Cementon, N. Y.

The Alpha Portland Cement Co. during the year carried further toward completion the extensive improvement program at its plant at Cementon, N. Y. In 1932 and early in 1933 the stone-crushing, stone-drying and clay-drying departments of the plant were relocated and completely rebuilt, and considerable new equipment was installed. Late in 1933 the rebuilding of the raw-grinding and kiln departments was begun and this program was completed during the summer of 1934.

The ball- and tube-mills formerly used for grinding raw materials were replaced by a single Babcock & Wilcox Type B roller-bearing mill operating in closed-circuit with an air-separator. Constant feed to this mill is assured by the use of a Richardson automatic Conveyo-Weigh scale. The kiln department was rebuilt and the building extended to provide for the installation of Allis-Chalmers shaker-type clinker coolers on each of the two 8-ft. kilns to which enlarged burning zones had been added. Two 6-ft. kilns were taken out and a third 8-ft. kiln was left unchanged. Three 8-ft. kilns now develop the original capacity of five kilns.

Other improvements included the replacement of the steel flues connecting the kilns with the waste-heat boilers by brick-lined concrete flues. These boilers were equipped with new and larger superheaters. The main power unit of the plant, a 3,000-kw. Westinghouse generator, was reconditioned and the steam end replaced by a modern and efficient turbine.

The Alpha company is also installing at its Alpha, Mo., plant a Miag Calcinator, the first to be purchased for use in this country.

In 1930 the company erected new storage-silos and a pack-house at its Jamesville, N. Y., plant. The silos have a total capacity of 100,000 bbl. and were erected by the Burrell Engineering & Construction Co. Old 25-cycle electrical equipment was also discarded and replaced with 60-cycle units, and synchronous motors were installed to improve the power-factor characteristics.

The Valley Forge Cement Co., West Conshohocken, Pa., in March, 1934, completed the installation of equipment for the production on a commercial scale of cement raw-material mixtures of any desired analysis. This process was developed by Charles H. Breerwood, vice-president and general manager of the company, after many years of research and is covered by a patent issued to him on Oct. 24, 1933. The method involves the application of the principle of flotation to separate the lime-bearing ingredients from the silica, iron and alumina, which can then be recombined in the desired proportions.

With this process it is possible to make standard Portland cement and various kinds of special cements from rock ordinarily considered to be unsuitable for cement manufacture. Excessive quantities of an essential element of the final mixture can be discarded or deficiencies can be made up. This is an added advantage as it makes possible the elimination of excessive free silica which is hard

to grind and does not combine readily at normal kiln temperatures. The quarrying costs have also been reduced because it is no longer necessary to select several grades of limestone which must be blended again and again before reaching the kiln. Fuel consumption and raw- and clinker-grinding costs have also been reduced, the latter saving alone more than paying for the cost of the installation. Only a portion of the raw materials need to be subjected to treatment, the amount depending on the composition of the rock in question and of the particular cement to be made.

The Valley Forge installation was made to make available vast deposits of limestone near the plant which were formerly unsuitable without the importation of purchased limestone. The equipment used at Valley Forge includes a Dorr Hydro-Separator, rake classifier, and 27-ft. and 80-ft. thickeners; nine 44-in. flotation cells; and three concrete storage-tanks.

An important development in the increase of kiln efficiency and fuel economy was completed dur-

The interior of the flotation and classification building of the Valley Forge Cement Co.

ing the year by the Coplay Cement Mfg. Co. at its dry-process plant at Coplay, Pa. The patented system involved is the result of many years of research on the part of D. J. Uhle, vice-president, and Dr. E. M. Grunewald, chemical engineer of the company, and is known as the Grudex preheating system. The waste gases leaving the rotary kiln are used to preheat the cement raw material, thereby saving 40 per cent. in fuel consumption and increasing the kiln capacity by the same percentage. These gases do not come into direct contact with the raw material after they leave the kiln.

An experimental preheating unit was installed on a 60-ft. kiln of the Coplay plant late in 1930. This was so successful that a full-sized unit (No. 1) was installed on one of the 9-ft. by 125-ft. kilns and went into operation in January, 1932. As a result of this installation further improvements were developed and incorporated in the No. 2 unit, which went into operation in May, 1934, on another kiln of the same size.

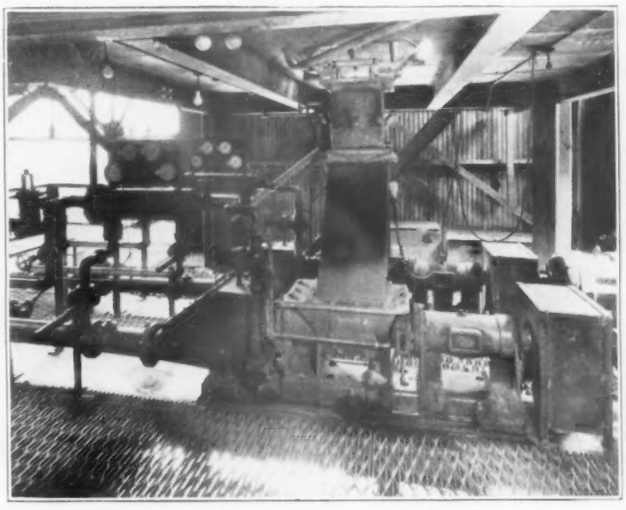
In the No. 2 unit a Fuller-Grunewald weighing and recording feeder carries the raw material to two Fuller-Kinyon pumps, each conveying the mate-

The flotation and classification building and thickeners at the plant of the Valley Forge Cement Co., West Conshohocken, Pa.

rial into one of two parallel systems of heat-resisting chrome-nickel-steel pipes about 1,200 ft. long located inside a tower built of firebrick and encased in steel sheeting. The entire length of the pipes is exposed to the heated gases coming from the kiln and passing upward through the tower into the stack above. Natural draft is entirely sufficient for the operation of this installation. The pipes are supported by metal brackets and baffles prevent the gases from rushing through the open center. The raw material, after passing through the pipes, is discharged into the back end of the rotary kiln at a temperature of from 1,300 to 1,400 deg. F.

The Santa Cruz Portland Cement Co., Davenport, Cal., in 1934 completed all except a few minor phases of an extensive construction program which gives it unexcelled distribution by water on the Pacific Coast. This program has been announced by officials of the company as involving an expenditure of between $1,000,000 and $1,500,000.

At the plant, which is located on a bluff overlooking the Pacific Ocean, a steel-and-concrete dock, extending 2,370 ft. out into the ocean, was built. Cement is pumped from the plant to 12 concrete storage-silos having a combined capacity of 100,000 bbl. at the shore end of the dock. Cement is then pumped from storage through pipe-lines to the end of the



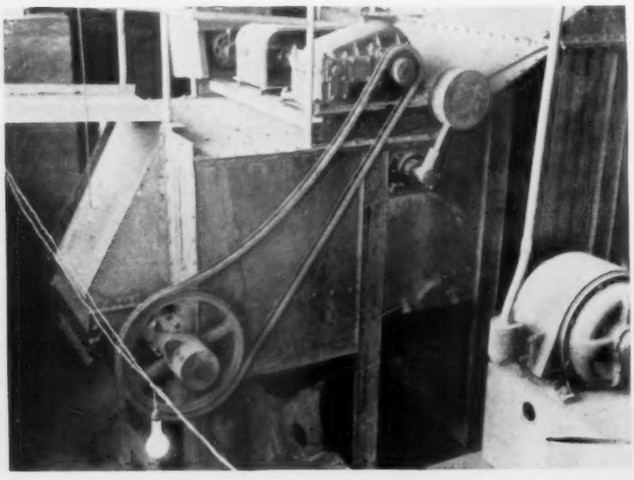
Two of the pneumatic-conveying systems which form a part of the preheating units installed at the Coplay Cement Mfg. Co., Coplay, Pa.

New steel-and-concrete dock of the Santa Cruz Portland Cement Co., Davenport, Cal., with boat "Santacruzcement."

dock into boats for shipment. Fuller-Kinyon cement-pumping equipment is used.

The steamer *Santacruzcement* was purchased and rebuilt at great cost into a self-unloading boat with a capacity of 40,000 bbl. and an unloading capacity of 2,000 bbl. per hr. An inner hull, with hoppers storing the cement, was built inside the original hull. Leathem D. Smith patented scraper systems with Sauerman 4-cu.yd. Crescent scrapers reclaim the cement in four tunnels in the hold. Two scrapers deliver cement to a 10-in. Fuller-Kinyon pump in the center of the boat and the other two to a pump in the stern. These pumps unload to the shore.

Cement-storage and packing plants have been completed at Portland, Ore., and Oakland, Stockton and Long Beach, Cal. Additional storage and packing units are contemplated for San Francisco, Cal.,



One of the two traveling-grate clinker coolers installed at the plant of the Oklahoma Portland Cement Co.

and Honolulu, Hawaii. The silos at Portland have a capacity of 82,500 bbl.

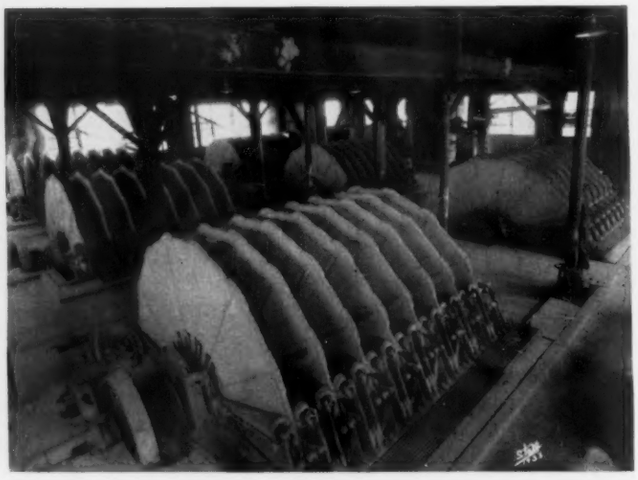
In 1934 also new automatic scales for weighing out car-load shipments of cement were installed at the main plant. In 1933 a 10-ft. by 72-in. Hardinge conical mill was installed for clinker grinding.

The Pennsylvania-Dixie Cement Corp., in March, 1934, put into operation a 5,150-ft. cable tramway of 250-tons-per-hr. capacity to carry limestone to its plant No. 6 at Nazareth, Pa. The company has three plants in and near Nazareth known as Plants 4, 5 and 6. Originally each plant had its own quarry. No. 5 quarry had to be abandoned in 1927 and a 10,162-ft., 150-tons-per-hr. American Steel & Wire Co. tramway was installed late in 1928 to carry rock from No. 4 quarry to No. 5 plant. In 1929 plant No. 5 was shut down due to lack of business and plants No. 4 and 6 were kept in operation. Owing to increasing overburden, however, it was later decided to abandon No. 6 quarry and the new American Steel & Wire Co. tramway was installed to carry rock to No. 6 plant from No. 5 plant, which is now used only as a transfer station between the two cableways.

The crusher building equipment at plant No. 4 had also been replaced during that period. Primary crushing is done by an Allis-Chalmers single-roll crusher. Scalping is done by an Allis-Chalmers vibrating screen and further reduction is accomplished by a Pennsylvania SXT13 hammer-mill. The conveying, elevating and storage system for cement rock was also rebuilt.

The first cableway discharges to open storage having a capacity of 35,000 tons, the stone being recovered by a tunnel belt-conveyor. This feeds a second belt which discharges into a 250-ton steel bin. A Jeffrey apron feeder discharges to the buckets of the new tramway and these unload at plant No. 6 into a 1,000-ton concrete silo. Belt feeders and belt and drag-chain conveyors carry the stone to six 600-ton capacity silos. Three Jeffrey vibrating feeders reclaim the stone to a belt-conveyor feeding the raw-mill building.

Early in 1931 important improvements were also made at the Penn-Dixie plant at Kingsport, Tenn., which effected a considerable decrease in operating costs. A system of yard storage was installed whereby the quarried stone is dumped from cars on a covered trestle on storage piles having a capacity of 4,000 tons. Recovery is accomplished by means of a Rex-Stearns belt-conveyor in a concrete tunnel under the piles. This inclines at its discharge end to feed a Williams Jumbo W1 hammer-mill, which

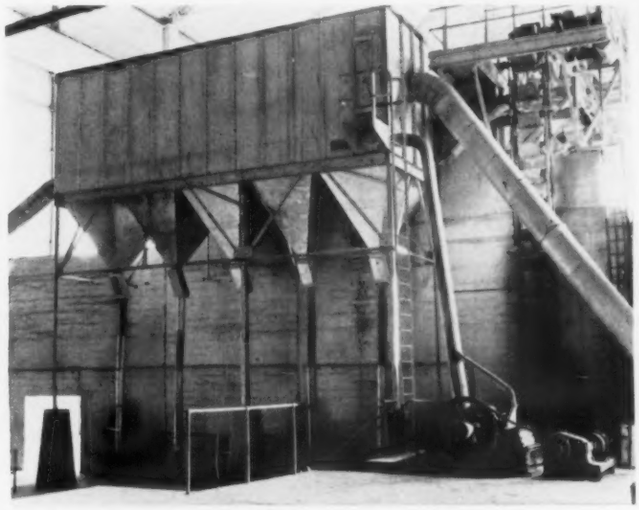


Some of the disk-type slurry filters installed at the plant of the Oklahoma Portland Cement Co.

replaces a two-stage system of crushing formerly used.

In 1930 storage facilities at the Penn-Dixie plant at Des Moines, Ia., were doubled by the installation of reinforced-concrete silos and a new packing plant.

The Oklahoma Portland Cement Co., Ada, Okla., has kept its wet-process plant there abreast of modern practice through a series of important improvements. Late in 1934 the installation of two Babcock & Wilcox waste-heat boilers was completed. These now supply all the power requirements of the plant. This followed the completion in July, 1934, of the installation of two Lee Process clinker coolers

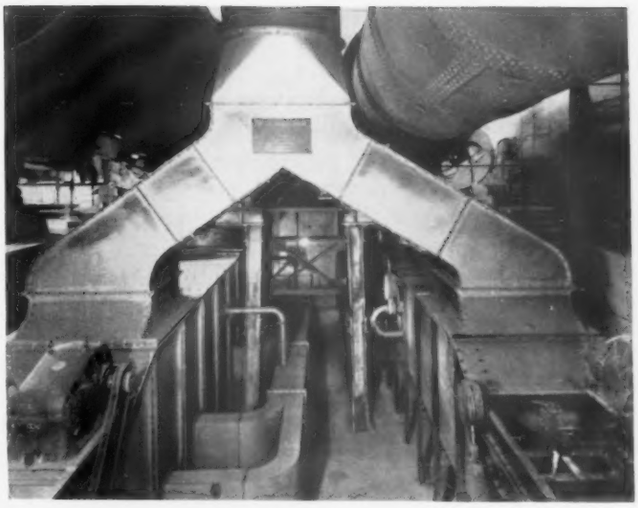


New dust-collector in the kiln room of the San Antonio Portland Cement Co.

to replace rotary coolers formerly used. These have reduced the gas-fuel consumption approximately 200 cu.ft. to about 1,500 cu.ft. per bbl. and at the same time have increased the kiln capacity from 82 to 88 bbl. per kiln-hr. or about 7 per cent. The temperature of the primary air for the kiln is 280 deg. F. and that of the secondary air 1,500 deg. F. compared to former temperatures near that of the atmosphere. The clinker discharge temperature is now about 125 deg. F. compared to the former temperature of 200 deg. F. with the rotary coolers. The grindability of the clinker was improved to such an extent that an increase of 5 bbl. per mill-hr. in grinding has been obtained without sacrificing quality or strength. The kiln-gas temperature has been increased from 1,300 to about 1,400 deg. F., which makes the waste-heat boilers more effective.

In 1933 the company completed the installation of Oliver American slurry filters on each of its three 240-ft. kilns. There are six 12-ft.-diameter 8-disk filters, two for each kiln. Ingersoll-Rand pumps create the vacuum. In 1931 three sets of Hum-mer vibrating screens were installed for operation in closed-circuit with the raw-grinding mills.

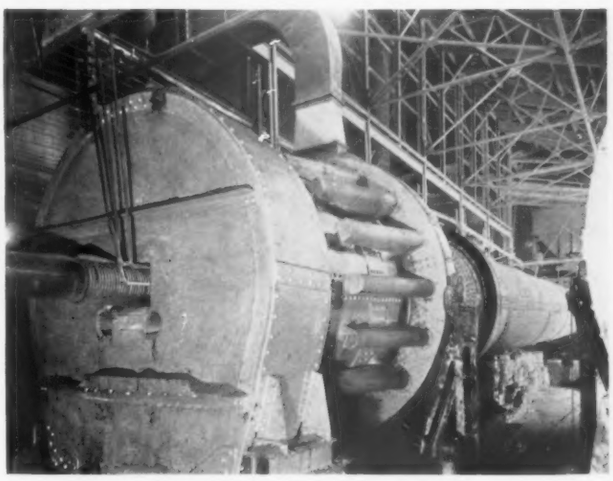
The San Antonio Portland Cement Co., San Antonio, Tex., a pioneer in the Southwest, in September, 1933, improved its plant with the installation of Lee Process clinker coolers on two of its three 220-ft. kilns. These have increased the kiln capacity



Two traveling-grate clinker coolers in the plant of the San Antonio Portland Cement Co.

from 1,200 to 1,525 bbl. daily and reduced the gas consumption from 1,000 to 1,250 cu.ft. per bbl. At the same time F. L. Smidth synchronized variable kiln feeders and combustion control were installed. In 1934 a Norblo dust-collector unit was installed in the kiln room and a 16-ft. Raymond air-separator was set up in the finish-grinding department.

One of the newer developments in the search of the cement industry for special cements varying in characteristics from standard Portland cement is a high-silica cement marketed by the High Silica Cement Corp., New York, N. Y., under the brand name of Eddystone. This cement is in reality a blend of Portland cement and a puzzuolan-lime cement and is produced under controlled conditions which insure a uniform product. It has a low lime content of 45 to 50 per cent. and is highly resistant to alkalis and active fluids. Immersion in a 10-per cent. sodium-sulphate or 10-per cent. magnesium-sulphate solution showed no appreciable disintegration after six months and there was an actual gain in strength. The shrinkage is no greater than that of Portland cements. The greater content of the activated silica produces great plasticity and work-



One of the two recuperators installed on kilns of the Kosmos Portland Cement Co.

ability which eliminates segregation. Equipment was installed in 1934 at the plant of the Allentown Portland Cement Co., Evansville, Pa., for the production of this cement.

The International Cement Corp. during the depression period continued its extensive expansion and improvement program which had been in progress prior to that time. Unfortunately complete information on this program is not available. In 1931 the Lone Star Cement Co. Texas installed two F. L. Smidth 400-ft. kilns as its plant near Houston and erected a new kiln building, which with incidental equipment cost $75,000. In 1930 the plant at Dallas, Tex., was improved and in 1932 equipment was installed for the production of "Incor" cement. In 1934 a new chemical and physical testing laboratory was erected at the Hudson, N. Y., plant, where research work for the entire corporation is now being done.

The Three Forks Portland Cement Co. in 1934 completed the construction of nine new reinforced-concrete storage-silos at its plant at Trident, Mont. These have a combined capacity of 125,000 bbl. and were built at an announced cost of $150,000.

The Spokane Portland Cement Co. in 1934 installed a Babcock & Wilcox Type B pulverizer for clinker grinding. This mill is operated in closed-circuit with a new 16-ft. Sturtevant separator and is fed by a new Schaffer Poidometer.

The Cowell Lime & Cement Co., Cowell, Cal., in 1934 installed a system of Ryder dust-collectors at an announced cost of $60,000.

The Lehigh Portland Cement Co. in 1934 installed three 14-ft. Sturtevant separators in the clinker-grinding department of its plant at Iola, Kan.

The Southwestern Portland Cement Co., Victorville, Cal., in 1934 replaced its quarry cars and locomotives with four large International dump trucks.

The Ash Grove Lime & Portland Cement Co. in 1934 erected five new concrete storage-silos with a total capacity of 100,000 bbl. at its plant at Chanute, Kan. A 20-ton Plymouth locomotive was purchased for its Louisville, Neb., plant.

The Kosmos Portland Cement Co. in 1933 climaxed a long series of improvements in its plant at Kosmosdale, Ky., which embraced every department of the plant from the quarry to the cement-shipping facilities. The latest of these was the installation of Vanderwerp recuperators on two 8½-ft. by 125-ft. rotary kilns. As a result these two kilns are now producing 20 per cent. over their former capacity and a coal saving of about 20 lb. per bbl. has been effected. The clinker temperature has been lowered to about 750 deg. F. Six Hardinge constant-weight feeders have been installed to feed clay, stone, gypsum, cement and coal.

In 1933 also the locomotives and cars formerly used in the quarry were replaced by four Mack motor trucks equipped with 8-ton Easton side-dump bodies. The chemical and physical laboratories at the plant were also rebuilt in that year. In 1932 auxiliary boilers using powdered coal were installed to supplement the waste-heat boilers.

Shovel loading to truck in quarry of Marquette Cement Mfg. Co., Cape Girardeau, Mo.

The Huron Portland Cement Co. late in 1933 completed a new cement-storage and packing plant at Oswego, N. Y. Six storage-silos 26 ft. in diameter and 90 ft. high and having a combined capacity of 75,000 bbl. were erected by the Burrell Engineering & Construction Co. Cement is unloaded from boats by means of a Fuller-Kinyon pumping system. Bates packers are used for bagging the cement. A Northern Blower Co. dust-collecting system was installed in the pack-house in 1934. In 1931 the company built an addition to its storage, packing and distributing plant at Detroit, Mich. The contract for this was let for $45,000 to the Burrell company.

The Medusa Portland Cement Co. in 1933 installed equipment for the production of a new temperature-resisting cement in its plants at Toledo. O., York, Pa., and Manitowoc, Wis. Parsons dust-collectors were installed in connection with this equipment.

The production and shipping facilities of the Marquette Cement Mfg. Co. have been greatly improved and expanded since 1929. Late in 1929 the company erected bulk-storage and packing plants at Memphis, Tenn., and St. Louis, Mo., served by a fleet of four self-unloading bulk-cement barges. In 1930 improvements totaling $150,000 were made. These included two additional storage-silos and other equipment at Memphis; a 124-ft. towboat, the *William Dickinson*, which is powered by two 350-hp. Atlas-Imperial Diesel engines; and four additional 175-ft. steel barges. Like the others, these barges were built by the Riter-Conley Co. and have a capacity of 800 tons each. The unloading equipment consists of screw-conveyors and 6-in. Fuller-Kinyon pumps. Five new storage-silos were also added to the St. Louis unit at a stated cost of $75,000.

In 1931 a Lee Process clinker cooler was installed at the Marquette plant at Oglesby, Ill. This was announced by the company as the first step in a $500,000 improvement program. The results obtained with these coolers were so satisfactory that in 1932 seven additional coolers were installed in

this plant and three in the plant at Cape Girardeau, Mo. In 1932 motor trucks replaced cars and locomotives in the quarry of the latter plant. Five 15-ton Sterling trucks with 10-cu.yd. Easton rear-dump bodies now haul all the stone required by the plant.

In 1932 a bulk-cement loading terminal was constructed at LaSalle, Ill., so that the cement barges could haul from this plant also. A coal-loading plant was erected at Grand Tower, Ill., in 1933 at a cost of $20,000. This is used for the shipment of Illinois coal to the Cape Girardeau plant. The latest improvement made by the company consisted of a Babcock & Wilcox unit-type direct-fired coal pulverizer installed at the Oglesby plant.

The Best Bros. Keene's Cement Co., Sun City, Kan., in 1932 completed an extensive improvement program. Open-quarrying methods and equipment were abandoned and the two mines are now being

The electrical precipitator installed in the plant of the Universal Atlas Cement Co. at Buffington, Ind.

operated with entirely new equipment. The narrow-gage railway and aërial tramway formerly operated were replaced by a standard-gage track. Roberts & Schaeffer Co. automatic weighing, dumping and car-moving equipment was installed. A new crusher building houses a Jeffrey single-roll crusher which replaced the two primary and two secondary crushers formerly used. According to John C. Best, president of the company, the cost of these changes ran into six figures.

The Fort Scott Hydraulic Cement Co., Ft. Scott, Kan., late in 1931 suffered damage of $25,000 to its plant, and in the following year the damaged part was rebuilt with entirely new equipment.

The packing plant and part of the storage house of the Consolidated Cement Corp., Cement City, Mich., were destroyed by fire in 1934 at a loss of $60,000. The damaged sections were immediately rebuilt with new equipment.

The American Aluminous Cement Co. in 1932 erected a 50-ton daily capacity aluminous-cement plant at San Pedro, Cal. Water-jacketed shaft furnaces of a type new to this country but common in Europe are used.

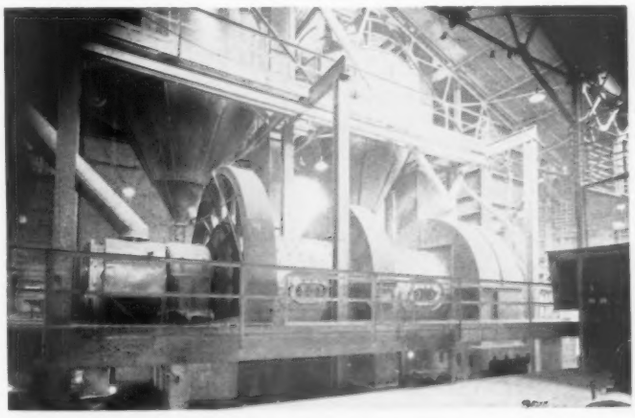
The National Portland Cement Co. of Dallas, Tex., in 1930 completed a small plant at Chubbuck, Cal., for the manufacture of white Portland cement. A kiln, crushers and other equipment were installed. A small grinding plant was also erected at Houston, Tex., in 1932, with the intention of shipping clinker from Chubbuck. This has a rated capacity of 200 bbl. daily and is said to have cost $50,000 to build. The equipment includes a tube-mill, elevators and packers. According to latest reports these plants are not operating.

The Universal Atlas Cement Co. invested vast sums during the depression period in new facilities and improvements at its various plants. One of the most important of these was the installation in 1930 of a new storage and packing plant in Milwaukee, Wis., and the construction of a self-unloading barge to carry cement to this point from its producing plant at Buffington, Ind.

Two 10-in. Fuller-Kinyon pumps, one acting as a booster, pump the cement a distance of 2,100 ft. to the barge-loading dock at Buffington. The all-steel barge is 226 ft. long and 40 ft. wide and has a capacity of 9,500 bbl. Its hull was designed and fabricated by the American Bridge Co. It is unloaded by means of a Leathem D. Smith tunnel scraper system using a 4-cu.yd. Sauerman Crescent scraper. A 10-in. Fuller-Kinyon pump fed by the scraper conveys the cement to the shore line. A Parsons dust-collector keeps the barge clean.

The plant at Milwaukee was built by the Worden-Allen Co. and consists of ten reinforced-concrete storage-silos having a total capacity of 50,000 bbl. Alongside the silos are the packing and sack-storage rooms. Two Bates packers sack the cement for delivery and a Blaw-Knox weighing batcher is used to batch bulk cement into trucks. The sack-room contains a bag-cleaner, sewing machines, etc. A Parson dust-collector serves all parts of the plant.

Other major improvements were made to the Universal Atlas plant at Buffington, Ind., in 1931 when fourteen Henry Vogt Machine Co. 830-hp. high-pressure waste-heat boilers were installed at an announced cost of $400,000. Later in 1931 a Cottrell electrical-precipitator system was installed at this plant at a cost of about $1,000,000. Plant



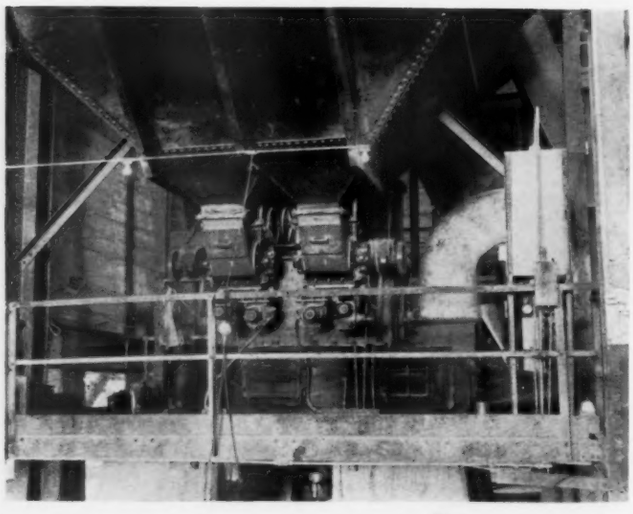
Raw grinding mill in closed-circuit with two separators in the plant of the Missouri Portland Cement Co., Sugar Creek, Mo.

No. 6, a dry-process operation has a capacity of 16,000 bbl. of cement daily and the dust-collection unit has a rated capacity of 1,050,000 cu.ft. of gas per min. This unit takes gases from 15 raw-material driers, 5 coal driers, 14 kilns and all the grinding, elevating and conveying machinery in those departments. Fuller-Kinyon pumps carry the collected dust back to the raw-grinding department. A 350-ft. concrete stack was erected in connection with this unit. In 1931 also a new raw-material-blending system was installed at this plant.

In 1932 the Universal Atlas plant at Hudson, N. Y., was improved by the construction of 12 storage-bins having a total capacity of 190,000 bbl. to supplement existing storage facilities. The Gifford-Wood Construction Co. was the designer and builder. A Vanderwerp recuperator was also installed on one of the kilns in this plant.

The Missouri Portland Cement Co. in 1930 improved its Red Ring plant at St. Louis, Mo., by the erection of a complete new finish-grinding mill. The two finish-grinding mills in this building are 9½-ft. by 8-ft. by 40-ft. four-compartment Allis-Chalmers Compeb units. Each mill is connected to two 16-ft. Sturtevant separators in such a way that any desired combination can be used. These mills are fed by two 20-in. Schaffer Poidometers. Allis-Chalmers dust-collectors are used on all the mills. New screw-conveyors, bucket-elevators, etc., were also installed. Two Fuller-Kinyon pumps handle the cement to storage. Also in 1930 twelve Hum-mer vibrating screens were installed in the raw-grinding department in closed-circuit with the three raw mills. In 1931 the coal-grinding department was rebuilt at a cost of $75,000.

In 1931 the company completed an extensive program at its Sugar Creek, Mo., plant which considerably increased its efficiency and lowered production costs. One of the major improvements was the installation of a 9½-ft. by 8-ft. by 35-ft. Allis-Chalmers Compeb raw-grinding mill operating in closed-circuit with two 16-ft. Raymond separators. An Allis-Chalmers dust-collector serves this mill and other near equipment. The dry material from the mill is handled by an 8-in. Fuller-Kinyon pump to concrete blending and storage silos and is blended by the same pump. Fuller rotary valves are used.



Coal grinding mill in the rebuilt plant of the Missouri Portland Cement Co. at Sugar Creek, Mo.

The blended fine raw material is fed to two 36-in. by 15-ft. Polysius pug-mills where the addition of about 8 per cent. of water nodulizes the material sufficiently to reduce stack-dust losses considerably. These feed two new A. G. Reeves kilns, which are 160 ft. long and 10 ft. in diameter and have 17-ft. calcining zones. Each kiln has a 135-hp. Buda gasoline engine for use as a stand-by.

The kilns discharge to two special Uhlig precoolers in which the dropping clinker is cooled by an upward rush of air which is utilized in the kiln for coal drying, etc. Coal for the kiln is pulverized and dried by a No. 13 Raymond mill. Two Schaffer Poidometers were installed for feeding clinker and gypsum to the finish mills, which are also connected to Raymond separators and dust-collectors.

The Aetna Portland Cement Co., Bay City, Mich., in 1930 began a program of plant improvement which took in practically every department of the plant and which is said by company officials to have cost about $300,000. The first to be completed were four new reinforced-concrete storage-silos having a combined capacity of 90,000 bbl. which were constructed by the Macdonald Engineering Co. The installation of Oliver American filters, consisting of four 12-ft. 6-in. diameter 8-disk filters, two for each of the two kilns, was completed early in 1931. These filters reduce the moisture content of the slurry to about 18 per cent. and increased the kiln capacity about 23 per cent. Hum-mer vibrating screens were also installed in closed-circuit with the raw-grinding mills.

The Glens Falls Portland Cement Co., Glens Falls, N. Y., in 1931 improved its plant by the installation of an F. L. Smidth 382-ft. Unax kiln with an unusually complete system of control. This kiln is equipped with a single-row Unax clinker cooler and replaced four 120-ft. kilns. Incidental installations included a 275-ft. concrete kiln stack built by the Rust Engineering Co. Among other equipment were a Smidth slurry feeder, fan, dampers, chain system and a centralized control-board of the most advanced type. According to company officials these improvements cost about $350,000.

The North American Cement Co. in 1931 completed an extensive improvement program at its plant at Security, Md. In that year it placed in operation a Cottrell electric precipitator to recover dust from the kiln flues, driers, elevators, conveyors and row-grinding mills. This precipitator is designed to handle 200,000 cu.ft. of gas per min. A Hardinge 10-ft. by 66-in. conical mill, equipped with a constant-weight feeder of the same make, was installed in 1930. A Pennsylvania SXT14 hammermill was also installed for secondary reduction of stone and a Pangborn dust-collector keeps this department clean.

The Howes Cave plant, too, was greatly improved during this period. In 1931 dust-collectors were installed to collect stack dust and in 1932 a Pangborn dust-collecting system and Howe hopper-type bulk-

loading scales were put into operation in the packhouse. In 1932 a Babcock & Wilcox direct-firing kiln mill was installed. This was the first unit of this type to be used in a cement plant and it grinds and feeds coal direct to the kiln, eliminating the usual intermediate steps. In 1933 the stone-storage capacity was enlarged and a new clay-storage bin was built. A 200-ton capacity concrete coal-storage bin and table feeders were installed.

The Pacific Portland Cement Co. in 1931 constructed additional reinforced-concrete storage-silos at its Redwood City, Cal., plant.

The Hercules Cement Corp. in 1931 purchased ten special bulk-cement railroad cars to make deliveries from its plant at Stockertown, Pa.

The Olympic Portland Cement Co. in 1931 installed at a new aërial tramway at its quarry near Limestone, Wash. The tramway is 2,300 ft. long and has a total drop of about 1,100 ft. It is operated by an Ottumwa Iron Works hoist.

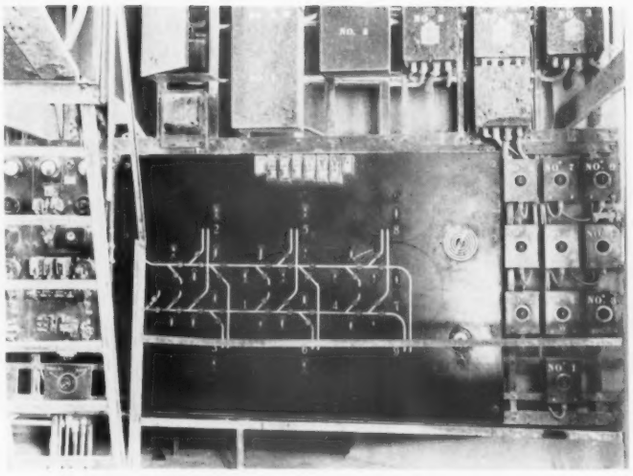
The Columbia Cement division of the Pittsburgh Plate Glass Co. in 1931 completed the installation of Dorr slurry thickeners, classifiers, etc., for a closed-circuit wet-grinding installation similar to the one which was installed by Dewey the previous year.

The Dewey Portland Cement Co. with plants at Davenport, Ia., and Dewey, Okla., was one of the first to realize the necessity for cutting down production costs to meet present conditions. The plant at Davenport was built in 1927 and a number of important changes have been made since that time. Early in 1930 a new clay pit was opened and an Allis-Chalmers 26-ft. wash-mill installed. A second level in the quarry was opened at the same time and a Bucyrus 2-yd. electric shovel installed, together with Davenport 15-ton and 30-ton gasoline-electric locomotives.

The next important improvement, completed in March, 1930, was the installation of Oliver American slurry filters on each of the three 11-ft. by 175-ft. rotary kilns. Each kiln has two 6-disk units for which vacuum is supplied by Chicago Pneumatic compressors.

Also in 1930 a new system for closed-circuit wet-grinding of raw materials was put into operation. Slurry from the first compartments of the raw-grinding mills is handled by Wilfley pumps to two 12-ft. wide Dorr classifiers. Oversize is returned to the mills and fines from these classifiers and the second compartments of the mills are pumped by Wilfley pumps to two 25-ft. Dorr bowl classifiers where clay slip is introduced. Oversize is again returned to the mills and fines go to a 225-ft. diameter Dorr traction thickener. The sludge from the thickener is sent by Wilfley pumps to mixing tanks equipped with Manitowoc Minogue agitators. Additional Wilfley pumps send the slurry to the slurry-filter feeders.

Previous to the above installations the kilns had a capacity of 4,700 bbl. daily. The filters increased the daily output to 5,500 bbl. and the closed-circuit system further increased it to 6,300 bbl. Before these units were installed the raw-grinding Compeb mills produced 70.1 bbl. per mill-hr. which was increased to 167 bbl. and the fineness of grinding has also been considerably increased. Formerly power consumption for the raw-grinding department was 5.5 kw.-hr. per bbl. This was reduced to 2.85 kw.-hr. including the closed-circuit equipment. The moisture content of the slime fed to the thickeners is about 90 per cent. The sludge leaving the thickener averages 45 per cent. and the filter cake has about 20 per cent. moisture.



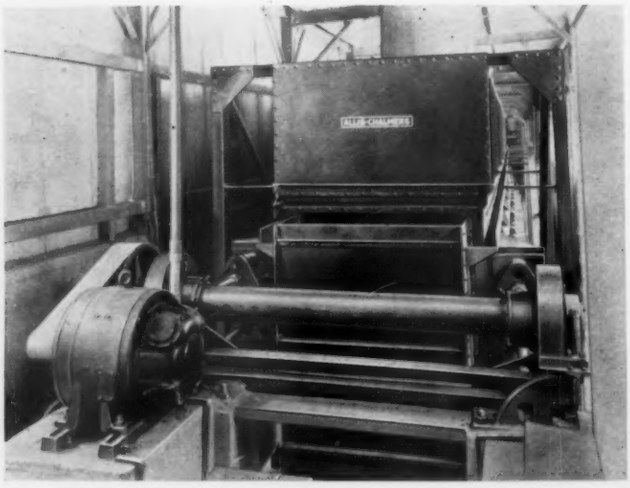
Board which controls the blending of cement raw materials in the plant of the Dewey Portland Cement Co. at Dewey, Okla.

The Dewey, Okla., plant of the Dewey Portland Cement Co. in 1930 installed a Fuller-Kinyon dry-blending system for its raw materials. This consists of eight 32-ft. by 90-ft. concrete blending silos with a total capacity of 90,000 bbl. Three Fuller-Kinyon pumps, Fuller rotary compressors, rotary valves and feeders are used in this system. One of the six 105-ft. kilns was lengthened to 150 ft. and a 14-ft. calcining zone was added. Seven 16-ft. Sturtevant separators were installed in the grinding departments and a Bradley Hercules mill and a Richardson scale were added in the finish mill. In 1934 a new 80-ft. by 200-ft. clinker-storage building was erected at a cost of $35,000.

The plant of the Arkansas Portland Cement Co. at Okay, Ark., went into operation late in 1929 and at that time was one of the most modern plants in this country. Since then, however, the company has seen fit to make a number of improvements which were provided for in the original design. In the summer of 1930 the temporary system of raw-material haulage, consisting of a steam locomotive and side-dump cars, was replaced by a Woodford remote-controlled electric haulage system. This system consists of three electric-motor-driven 10-cu.yd. cars controlled from a tower at the plant.

A system of Oliver American slurry filters went into operation later in 1930 on the single 11-ft. 6-in. by 300-ft. kiln. This consists of three 12½-ft. diameter 12-disk units for which the vacuum is furnished by an Ingersoll-Rand pump. As a result of this installation the capacity of the kiln was increased from 2,170 bbl. to 3,300 bbl. daily. The gas-fuel rate was reduced 25 to 30 per cent to about 1,650 cu.ft. per bbl. Further economies were obtained early in 1933 when an Allis-Chalmers reciprocating-grate clinker cooler was installed.

The Keystone Portland Cement Co., Bath, Pa., in 1930 made extensive improvements to its plant, which was built in 1928 with two 250-ft. kilns. Later it was decided to double the capacity of this plant by the addition of two more kilns and other incidental equipment. This program was completed in June, 1929.



Vibrating clinker cooler installed on the single kiln of the Arkansas Portland Cement Co., Okay, Ark.

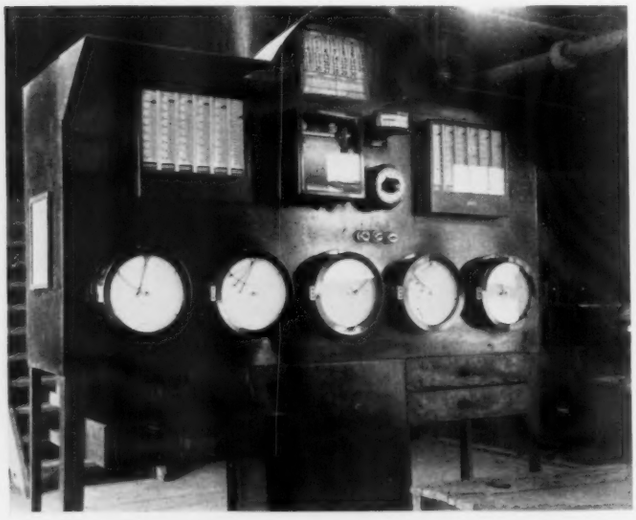
The improvements made in 1930 included the construction of 19 additional concrete cement-storage silos and two additional pack-houses each containing two Bates packers. Bethlehem combined mechanical and air agitators for slurry were installed to supplement the former system which used air alone. The original crushing plant was replaced with a new building in which were installed a Pennsylvania 36-in. by 60-in. single-roll primary crusher, a pan-conveyor and a Pennsylvania SXT-14 Super-Thor hammer-mill. A Norblo dust-collecting system keeps this building clean. A new system of slurry feeders with automatically-controlled feeders was also installed in the plant.

Originally quarried stone was hauled in cars by gasoline locomotives to the crushing plant. As the quarry was deepened, however, this system became impractical. A double-track incline was then installed which has two Vulcan disappearing top barneys operated by a 2-drum Flory hoist. Two locomotives now haul the quarry cars to the foot of the incline and a third locomotive takes them from the top of the incline to the crusher building.

In 1929 the Great Lakes Portland Cement Co. installed at Cleveland, O., a storage and packing plant which handled cement from the company's plant at Buffalo, N. Y. This had two units of two and six storage-silos, respectively. In 1930 a complete clinker-grinding department of 1,000 bbl. daily capacity was added. Clinker instead of cement is now shipped from Buffalo by boat and is stored in the two-silo unit. The new mill includes cement, gypsum, and clinker elevators, conveyors, etc., a Norblo dust-collector and an Allis-Chalmers 8-ft. by 30-ft. Compeb mill with a table feeder of the same make. All the electrical and other equipment was also new.

The plant of the Wolverine Portland Cement Co. at Quincy, Mich., one of the few remaining cement plants using marl as a raw material, was considerably improved early in 1930 by the installation of a new 10-ft. by 305-ft. rotary kiln and incidental equipment. The history of this plant is in effect a history of rotary-kiln development. When built in 1899 there were fourteen 6-ft. by 60-ft. kilns. These were replaced in 1910 by seven 6-ft. by 120-ft kilns and these in turn were replaced by the present single unit.

At the new kiln-feed building a bucket-elevator feeds the slurry to a large concrete feed tank equipped with a Manitowoc Minogue agitator. A second elevator takes it to the kiln feeder which is driven from the kiln. The Allis-Chalmers kiln is fitted with an F. L. Smidth chain system and a Buffalo fan. The 10-ft. by 100-ft. concrete kiln stack, the two concrete elevator casings and the slurry-storage tank were all built by the Rust Engineering Co.



Control board for the waste-heat boilers in the plant of the Nebraska Cement Co. at Superior, Neb.

The Nebraska Cement Co. early in 1930 made improvements to its plant at Superior, Neb., which greatly decreased its fuel costs. Two Babcock & Wilcox Sterling-type waste-heat boilers equipped with Greene fuel economizers now generate all the plant power. These replaced the coal-fired boilers formerly used. At the same time gas replaced coal as kiln fuel, eliminating processing and handling costs. Hum-mer vibrating screens installed in closed-circuit with the raw-grinding mills increased their efficiency and reduced the slurry moisture. Air-separators installed on the finishing mills also improved their performance. Later in the year a new quarry was opened and a 6,800-ft. track of new 85-lb. steel was laid. A Bucyrus 1½-cu.yd. Diesel shovel replaced the steam shovels formerly used.

The importance being placed by cement-plant operators on fuel savings and other economies is well illustrated by the installation in 1930 of slurry filters in the plant of the Lawrence Portland Cement Co. at Thomaston, Me., which was built in

(Continued on page 66)

What Makers of Lime Have Accomplished in the Half-Decade Just Ended

THE lime industry in 1934 showed little if any increase in production over the previous year but the steady downward trend since 1926 has been stopped and all indications point to more business in 1935. The tremendous decrease in building construction was mainly responsible for this decline and a betterment in this field is expected to increase the 1935 demand. A growing demand for lime for the chemical, glass, steel and other industries began to be felt in 1933 and is at present the mainstay of the industry. The sharp increase in the demand for roasted dolomite helped some producers.

The present spirit of optimism toward the future among lime manufacturers is based largely on the fact that prices have now been on an equitable level for about two years, making it possible for the producers to show a little profit at a moderate percentage of productive capacity.

Comparatively few new lime plants were built in the years 1930 to 1934 and many of the more important of these were built by alkali, chemical, paper and other companies to supply lime for their own use. These companies also contributed much of the technical development which took place during these years. Commercial lime producers in general concentrated their expenditures and efforts on improving their product to meet new demands and in increasing the efficiency of their plants.

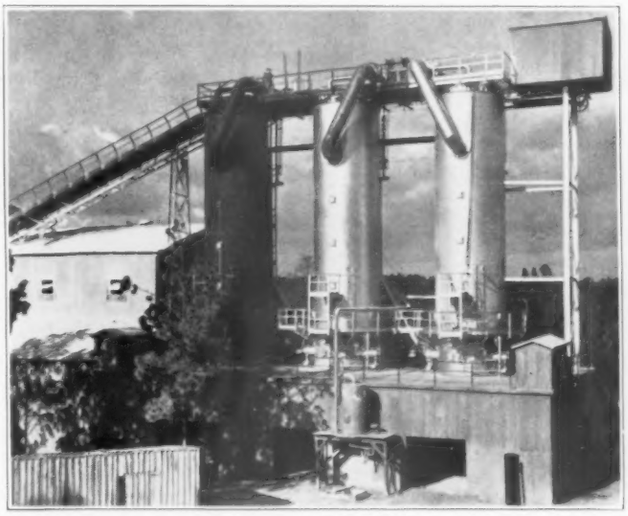
The outstanding new commercial lime plant of 1934 is that of the Louisiana Lime Products Corp., Easton, La., which went into operation in January. This is one of the largest commercial lime plants in the entire South and the only one in Louisiana. It embodies some of the latest developments in vertical-kiln design and operation and has a capacity of 100 tons of lump lime and 30 tons of hydrated lime daily. About 300 tons of crushed stone and 60 tons of agricultural limestone are also produced.

The overburden is removed from the deposit by hydraulicking which also loosens the rock. A 6-ft. by 40-ft. Allis-Chalmers rotary washer removes impurities and separates the spalls from the kiln stone. The spalls are crushed and screened and discharged to stock-piles from which they are loaded for shipment by a Mead-Morrison gasoline crane. Fine sizes are passed through a rotary drier and are further reduced by an Allis-Chalmers hammer-mill.

The kiln stone is hauled up an incline to the three gas-fired shaft kilns which are 60 ft. high and have shafts of oval cross-section. Each kiln has air-operated feed and discharge gates, a draft fan and a CO_2 fan, a recording gas-volume meter, draft gage and gas analyzer. The complete and compact hydrating plant includes a Clyde batch hydrator, a 7-ft. Sturtevant separator, a crusher and a hammer-mill. Bags are packed by a Valve Bag packer.

One of the most important recent developments of interest to lime producers involves no additional capacity in the commercial production of lime. The Southern Alkali Corp. on Sept. 1, 1934, put in operation a huge new alkali plant at Corpus Christi, Tex., at a total cost of $7,000,000. Two distinct lime-producing units form important parts of this development.

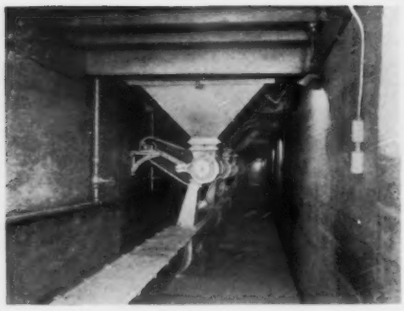
The raw materials used in the manufacture of alkali at this plant are salt, lime made from oyster shell, and lime made from lime-stone. The salt brine is obtained from company-owned wells 60 mi. west of Corpus Christi and the brine is piped the entire distance by gravity. Coke is used to produce CO_2 for carbonating the ammoniated brine to form sodium bicarbonate, which is then roasted to form sodium carbonate or soda ash. The lime produced from limestone in the vertical kiln is used only to produce CO_2 gas and to recover the ammonia used.

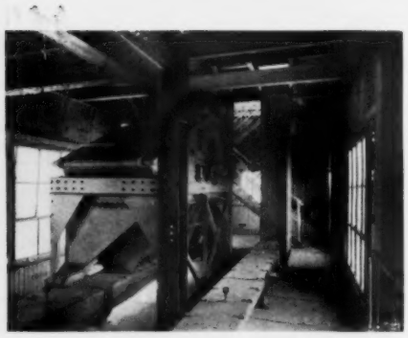


The three-gas-fired shaft kilns at the plant of the Louisiana Lime Products Corp. Hydrating building is at left.

Limestone is shipped in by railway from the New Braunfels district in the desired sizes. After being mixed with a certain proportion of coke the stone is elevated by a skip hoist to the 16-ft.-diameter vertical kiln which has a capacity of 200 tons of lime daily. CO_2 is drawn from the kiln and the lime is slaked in hot water by rotary slakers to form milk of lime. This is then passed over vibrating screens and to agitator tanks from which it is fed to the ammonia stills.

Oyster shell is dredged in Nueces Bay near the plant and is stored in stock-piles. The shell is burned in two 9-ft. by 160-ft. natural-gas-fired rotary kilns whenever it becomes necessary to add make-up lime to the recovered calcium-carbonate





Views of the hydrating plant of the Kelley Island Lime & Transport Co. at Clay Center, O. Left, feeders which reclaim hydrate from storage; center, the two bag-packers; right, inclosed vibrating screen, conveyor and elevator.

mud, the lime from which is used in the causticizing process.

In December, 1934, the Mathieson Alkali Works put in operation a huge new alkali plant at Lake Charles, La. This includes a modern lime-producing unit. The estimated cost of the entire plant is $7,500,000, of which about $770,000 was spent on the lime-making facilities. Rotary kilns of high efficiency are used in producing the lime, oyster shells being the source of the raw material. Location on a deep-water channel makes shipment of alkali by ocean steamers possible.

The Dixie Lime Products Co., in October, 1933, suffered a fire loss of about $20,000 when its hydrating plant at Zuber, Fla., was destroyed. This has not yet been rebuilt but early in 1934 a Raymond kiln mill and a Raymond 9-ft. Cook wet dust-collector were installed at the company's lime plant at Kendrick, Fla. A road-material plant was installed at Zuber in 1933 and recent reports state that a dolomite mine has been opened at Lebanon, Fla.

The Lawrence Portland Cement Co., Thomaston, Me., in 1934 added additional equipment and rebuilt its lime-hydrating plant. A Raymond roller-mill equipped with a Whizzer separator was installed for grinding limestone.

The Bellefonte, Pa., plant of the American Lime & Stone Co., a subsidiary of the Warner Co., was considerably improved during this period. This plant is one of the largest and most modern in existence and is constantly being kept up to date. In 1931 a complete new hydrate plant and a Norblo dust-collecting system were added and changes were made in the drying plant. An additional screen for pebble lime was installed. In 1934 a new gas-producer was added to the two units already in use at a reported cost of about $25,000. In 1930 air-separators and additional crushing equipment were bought.

The new plant of the Southern Alkali Corp. with top of shaft kiln and rotary kiln stack visible in right background.

The Mississippi Lime & Material Co. early in 1934 installed two Niagara vibrating screens in its plant at Alton, Ill. One of these was a 4-ft. by 16-ft. triple-deck unit and the other a 4-ft. by 14-ft. double-deck machine. Somewhat earlier a 12-ft. Raymond separator was installed at the company's plant at Ste. Genevieve, Mo.

In 1934 the Marblehead Lime Co., Quincy, Ill., made some improvements which are of interest chiefly because of the installation of a type of equipment new to this field. This is a Stephens-Adamson Redler continuous-flow conveyor, which carries bulk lime both horizontally and up a steep incline. A Stephens-Adamson 4-ft. by 6-ft. triple-deck vibrating screen was also put in service.

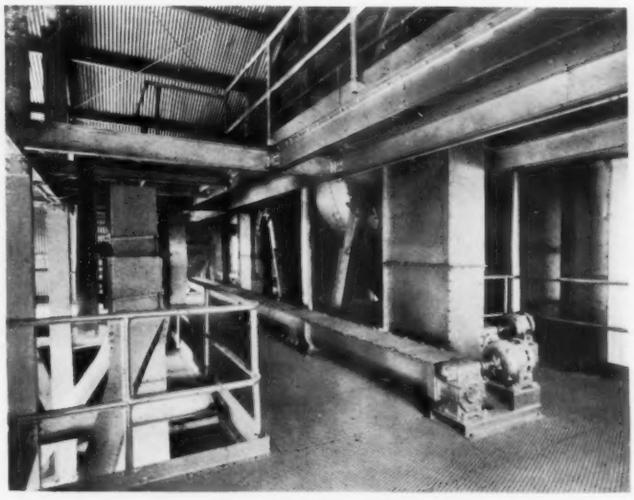
The National Mortar & Supply Co. in 1934 improved its operations at Gibsonburg, O., by the installation of an 8-ton Plymouth gasoline locomotive. The Atlas Lime Co. in 1934 completed extensive improvements to its plant at El Paso, Tex.

The Kelley Island Lime & Transport Co. during the depression period carried on an extensive and systematic betterment program at its Clay Center, O., plants. The latest improvement is a new rotary-kiln plant which produces roasted dolomite for use in steel mills and went into operation late in 1933. This plant uses the latest types of grinding and handling machinery and is entirely of steel-and-concrete construction. The size of this plant may

be judged from the fact that 385 tons of structural steel were used in its construction.

In 1931 the company had completed a new lime-hydrating and storage plant known as Plant B, which is also a model of its kind. It, too, is entirely of steel-and-concrete construction, and it has a capacity of 100 tons of finishing hydrate in an 8-hr. day. Quicklime is ground by a Williams hammer-mill and is fed to two Clyde 1½-ton batch hydrators. Hydrated lime goes to two 33-in. Fuller-Lehigh finishing mills and then to two Valve Bag packers. It may also be by-passed to three steel storage silos of 1,000 tons capacity each. Raymond feeders under these silos reclaim the lime from storage. Link-Belt conveyors and elevators are used throughout this plant.

The Oregon Lime Products Co. in 1933 completed a new lime and stone plant at Williams, Ore. This has an annual capacity of 5,000 tons of lime and



Storage-bins, bucket-elevators and screw-conveyors in hydrat'ng plant of Kelley Island Lime & Transport Co.

140,000 tons of ground limestone. Arnold & Weigel kilns, vibrating screens, crushers and hammer-mills are among the equipment installed.

An experimental plant for the manufacture of CO_2 gas with lime as a by-product went into operation in 1933 at Woodville, O. This process was invented by Dr. Edward P. Gillette, of the Gillette Research Corp., Toledo, O. The outstanding features of the vertical kiln in use are the calcining tubes which are 3 in. by 20 in. in section.

In 1929 Geo. L. Scott, Sr., a pioneer in the Calera lime district of Alabama, erected a crushed-stone plant at Siluria, Ala. In 1931 he began the erection of the present lime plant of the Alabaster Lime Co. which went into operation in August, 1933. The two vertical kilns are 14 ft. in exterior diameter and 55 ft. high, and are coal-and-wood fired. A Jeffrey pan conveyor feeds a Sturtevant rotary crusher. The hydrating is done by a Clyde batch machine having a capacity of 5 tons daily. A Sturtevant separator rejects the waste material and feeds the lime to a Bates packer.

The James River Hydrate & Supply Co., Buchanan, Va., in 1933 completed a new plant of large capacity.

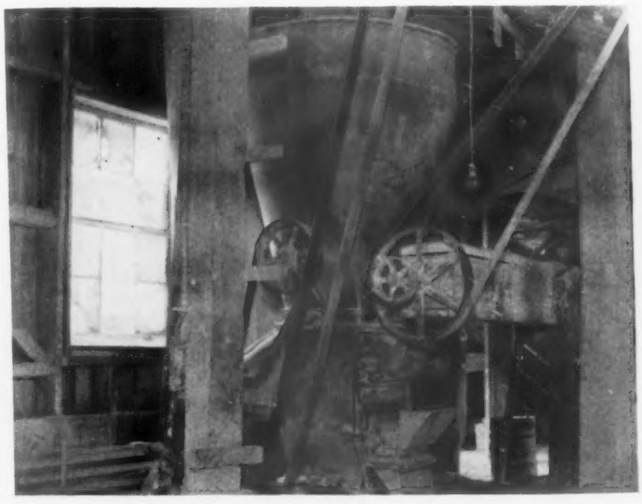
Exterior view of hydrating building of Kelley Island Lime & Transport Co. at Clay Center, O.

The Virginia Lime Products Co., Inc., in June, 1933, took over the plant of the Moore Lime Co. at Eagle Mountain, Va. Immediately a number of important improvements were made. A new quarry was opened across James River from the plant and a cableway was installed to convey the stone to the plant. New crushing and packing equipment was also added.

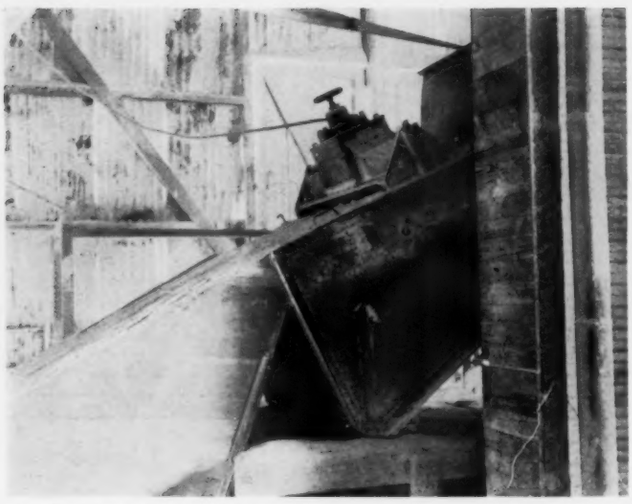
The 1,250-ft. cableway is operated by a Lidgerwood hoist and uses Leschen cable. Burning is done in two vertical kilns having a daily capacity of 13 tons each. For hydrating a Clyde batch machine is used and for quicklime crushing Butterworth & Lowe crushers. A Raymond separator feeds a Bates bagger and a Gruendler hammer-mill.

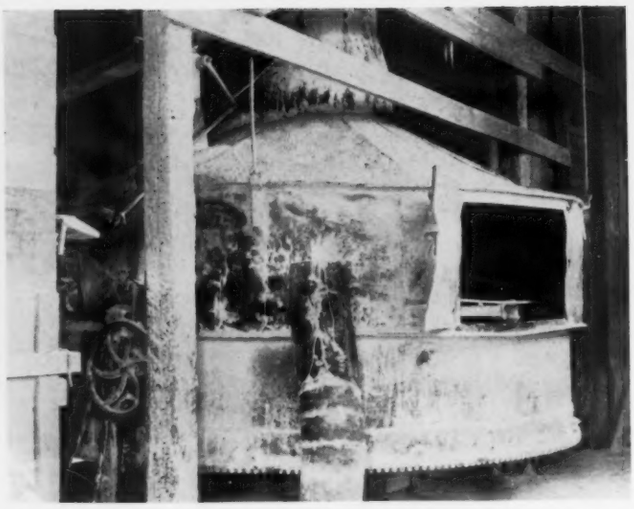
Whiterock Quarries, Inc., in 1933 built a new stone-and-steel hoist house and installed a new hoist at its plant at Pleasant Gap, Pa. In 1931 four new vertical lime kilns were added to the 18 already in operation, increasing the plant's capacity about 80 tons daily.

The Holmes Lime & Cement Co., Felton, Cal., early in 1933 completed an extensive improvement program and installed considerable new equipment.



Some of the equipment in the rebuilt plant of the Virginia Lime Products Co., Inc., Eagle Mountain, Va.





Interior views in the rebuilt hydrate plant of the Florida Lime Co., Inc., Ocala, Fla. Electric vibrating screen and elevator at left, batch hydrator at right.

The Ripplemead Lime Co., Ripplemead, Va., in 1933 completed a new hydrate plant. Lump lime from the kilns is passed to an Allis-Chalmers Pulverator and then to a Kuntz horizontal-type continuous hydrator. The hydrated lime goes to a Sturtevant separator before being sacked.

The Rockland & Rockport Lime Corp., Rockland, Me., in 1933 rebuilt the hydrating plant which was destroyed by fire in July, 1932.

The Campbell Stone Co., Afton, Mich., late in 1933 completed the rebuilding of its lime-burning plant which burned at a loss of $100,000 in May, 1933. The hydrating and crushed-stone plants were not damaged.

The Chemical Lime Co., Bellefonte, Pa., in 1933 put in operation an electric lime kiln for the separation of stone into lime and CO_2. Robert S. Walker, general manager of the company, was granted basic patents on this process.

The Florida Lime Co., Inc., in 1931 suffered the complete loss by fire of its hydrated-lime plant at Ocala, Fla. This was immediately rebuilt and the new plant went into operation in January, 1932 with complete new equipment. Quicklime is crushed by a Sturtevant rotary crusher and is fed to a Clyde batch hydrator. The hydrated lime is discharged into an O. B. Wyse pulverizer and a Hummer vibrating screen. Bags are packed by a Valve Bag Co. packer.

The United States Lime Products Corp., in 1932 installed a Raymond separator in its plant at Sloan, Nev. Improvements had been made to this plant and the one at Sonora, Cal., in 1930.

The Western Lime & Cement Co. late in 1932 began the operation of a new lime-hydrating unit at its Green Bay, Wis., plant. It has a capacity of 5 tons per hr. Lump quicklime is crushed by a Sturtevant rotary crusher and is fed to a No. 3 Clyde hydrator, the product of which goes to a Raymond separating system consisting of a No. 1 pulverizer and separator, a fan and an 8-ft. cyclone.

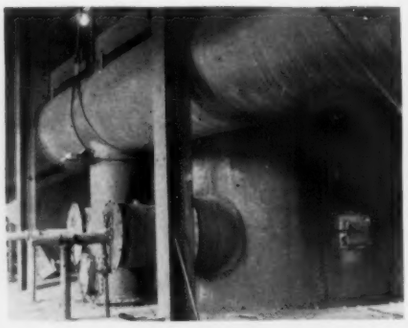
Fowler & Pay, in 1932 installed a complete hydrating unit at its plant at LeRoy, Minn. The equipment includes a Clyde hydrator and a Raymond separator.

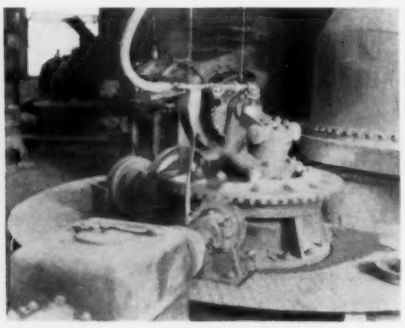
The Sewell Lime Co., in 1932 completed an extensive improvement program at its plant at Lime Mountain, Idaho. New kilns were erected, crushers and other equipment installed and a new spur track laid.

The California Portland Cement Co., Colton, Cal., in 1932 installed a Raymond roller-mill for the production of hydrated and caustic lime.

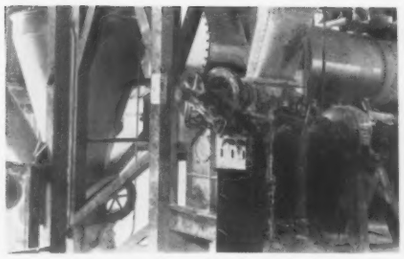
A small but modern plant was put in operation in July, 1931, by the New Process Lime Co. at Tucson, Ariz. It has a single vertical kiln with a capacity of 15 tons of quicklime daily and is of steel-and-concrete construction.

The Ste. Genevieve Lime & Quarry Co. early in 1931 completed the rebuilding and remodeling of





Three views of the plant of the National Carbide Corp., Ivanhoe, Va. Exterior view at left shows three kilns and ship hoist in foreground. Gas and CO_2 pipes to kilns are shown in center. At the right is the top of one of the two gas-producers in this plant.



The rotary-kiln plant of the California Chemical Corp. at Newark, Cal. In the exterior view the hydrating building is at the left and the shell-washing equipment is at the right. The hydrator, packer and mill are shown in the interior view.

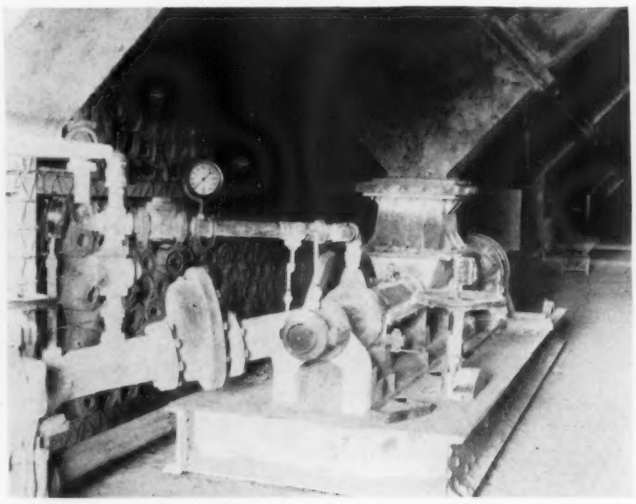
its plant at Ste. Genevieve, Mo. The latest type kilns and buildings of all-steel construction were erected.

The Idaho Lime Co., Boise, Idaho, late in 1931 built a new hydrate plant to replace a former unit which had been destroyed by fire. Sturtevant crushers, a Clyde hydrator and Blaw-Knox incidental equipment were installed.

The National Carbide Corp., in February, 1930, completed the construction of a new lime plant alongside its carbide plant at Ivanhoe, Va., replacing an older plant at the same location. This was originally a 2-kiln plant but in 1931 a third kiln was added.

Stone is loaded in the quarry into 1½-cu.yd. Easton cars hauled by a 3-ton Plymouth gasoline locomotive. The cars unload into railway cars for delivery to the plant. Here the stone is loaded from storage into 2-cu.yd. Atlas cars which are elevated by a Bartlett & Snow skip hoist to the top of the kilns. Coal is raised in the same manner to a storage-bin over the two Wood 10-ft. gas-producers. Each of the three kilns has a capacity of 40 tons daily with a fuel ratio of 5 to 1. A New Holland roll-crusher reduces the quicklime to the desired size for use in the manufacture of calcium carbide.

One of the most interesting plants of 1930 is that of the California Chemical Corp., at Newark, Cal., which went into operation late that year. This is a rotary-kiln plant using oil as fuel and oyster shells as raw material. It has a daily capacity of 30 tons of quicklime and hydrated lime. Much of the lime produced is used in the company's chemical processes and the remainder is sold on the open market.



One of the pneumatic-pumping systems which recovers lime from storage-silos at plant of Mohawk Limestone Products Co.

Oyster shells are dredged from San Francisco Bay and are thoroughly washed before being fed into the 6-ft. by 7-ft. by 80-ft. rotary kiln. The kiln is lined with periclase firebrick of the company's own manufacture. This withstands the unusually high temperatures of 3,050 to 3,100 deg. F. Hydrating is done by a McGann Schulthess continuous unit which has a capacity of 2½ tons per hr. and is connected to a Raymond mill and cyclone. Bags are packed by a Bates bagger.

In December, 1930, the Chester Valley Lime & Products Co. put in operation at Paoli, Pa., a lime plant which was modern in every sense. It was designed and all the equipment was installed by the McGann Mfg. Co. Its capacity is rated at 80 tons of hydrated lime daily. In addition 200 tons of crushed and sized stone can be produced.

The four coal-fired vertical kilns are 60 ft. high above the draw-level floor and have an exterior diameter of 11 ft. The lump lime is removed by a vibrating screen but can be by-passed to a Pennsylvania single-roll crusher when desired. Hydrating is done by a No. 6 McGann Schulthess continuous machine connected with a Sturtevant separator. Sacks are filled with a Bates bag-packer. Link-Belt conveyors are used throughout the plant.

The Mohawk Limestone Products Co. in 1930 completed extensive improvements to its lime and crushed-stone plant at Jordanville, N. Y. Most important was a new concrete silo storage unit, a pack-house and a Fuller-Kinyon pumping system. The storage unit was built by M. A. Long & Co. and consists of three silos each 50 ft. in diameter and 80 ft. high. Two of these are used for storing hydrated lime and the other for pulverized limestone. These materials are placed in storage by stationary Fuller-Kinyon pumps and are recovered by two 5-in. pumps mounted on movable frames. The new pack-house contains bag-packers for each of these materials.

The firm of Sheffield, Paul & Sheffield in 1930 placed in operation a new and modern lime plant at Perkinsville, Ariz., to take the place of its former plant at Puntenney. Its annual capacity is 7,500 tons of quicklime. This plant is now operated under the name of Storey Lime Co.

The United States Gypsum Co. in 1930 bought the plant of the Farnam-Cheshire Lime Co. at Farnams, Mass., and made extensive improvements. In 1931 limestone-grinding equipment was installed in its lime plant at Genoa, O.

Tracing Five Years of Plant Progress in the Crushed-Stone Industry

THE crushed-stone industry in 1934 showed a marked upturn from a period of depression during which the ratio of production to capacity decreased rapidly from year to year and reached its "low" in 1933. Official government figures show an increase of 36 per cent. in railroad shipments for the first nine months of 1934 over the same period of 1933. Water shipments also increased. No complete figures on truck shipments have ever been available but it is safe to say that this also increased.

Much of this recent improvement was due to an increase in general construction, mostly government-financed, but highways continued to be the most important single market. The demand for railroad ballast is also increasing. Prices as a whole have improved in the last year or two.

As in other nonmetallic-mineral industries most crushed-stone producers during the past few years concentrated their efforts on the attainment of increased efficiency and economy of operation in existing plants. The development of new uses for stone received more attention. Dust, stone-sand and agricultural limestone increased in demand due to a trend toward bituminous pavements and to an improvement in farm conditions. No large new commercial plants were built in 1934 and only a few in 1933, most new plants being erected to supply a local demand.

The outstanding new crushed-stone plant of 1934 is that erected at Norris, Tenn., by the Tennessee Valley Authority to supply aggregates for the construction of Norris Dam. This plant, which went into operation July 17, has a capacity of 300 tons per hr. of sizes ranging from 6 in. to stone sand.

The quarry equipment consists of a number of wagon drills, two 3-cu.yd. electric shovels, a Marion No. 450 and a Bucyrus-Erie No. 750, both equipped with Ward-Leonard control, and five motor trucks with 12-cu.yd. end-dump bodies. Two of these are Hugs and three are Whites. An Allis-Chalmers 42-in. gyratory crusher discharges by means of a Traylor vibrating feeder to a conveyor leading to a Robins vibrating scalping screen. The oversize material is reduced by a Symons 5½-ft. standard cone crusher. A series of belt-conveyors feed one Niagara and four Stephens-Adamson vibrating screens.

Provisions are made so that any desired sizes can also be fed to a pulverizing plant. Here Traylor vibrating feeders discharge to two Allis-Chalmers 42-in. by 48-in. Pulverators. Four Allis-Chalmers vibrating screens are used for sand sizing and a Link-Belt and a Dorr classifier for final classification. Barber-Greene stacking conveyors put the sand in storage. All the sized materials are stored in stock-piles from which they are reclaimed by a belt-conveyor in a 646-ft. concrete tunnel.

The Romesberg Stone Co., Inc., in 1934 erected a 25-ton per hr. plant at Kregar, Pa., to supply local demands. The equipment includes a No. 5 Champion crusher, a McLanahan & Stone double-roll crusher, and quarrying, screening and conveying equipment. A motor truck hauls quarried stone to the plant. A 21-in. by 24-in. McLanahan & Stone double-roll crusher was installed in the plant at Cool Spring, Pa., and in 1932 the company installed an 18-in. by 24-in. McLanahan & Stone double-roll crusher at its original plant at Atlantic, Pa.

The Allentown Portland Cement Co. in 1930 opened its Kirby Quarry near its cement plant at Evansville, Pa., and erected a 100-ton per hr. commercial crushed-stone plant. This plant also supplies the cement mill with the relatively small tonnage of limestone needed to correct the composition of the cement rock. Motor trucks discharge the quarried stone into a 28-in. by 36-in. Traylor jaw crusher. Three secondary gyratory crushers, two Traylor revolving screens and two Mitchell electric vibrating screens comprise the important equipment.

The artistic power plant of Heumader Quarries. Note the landscaping being done on the grounds.

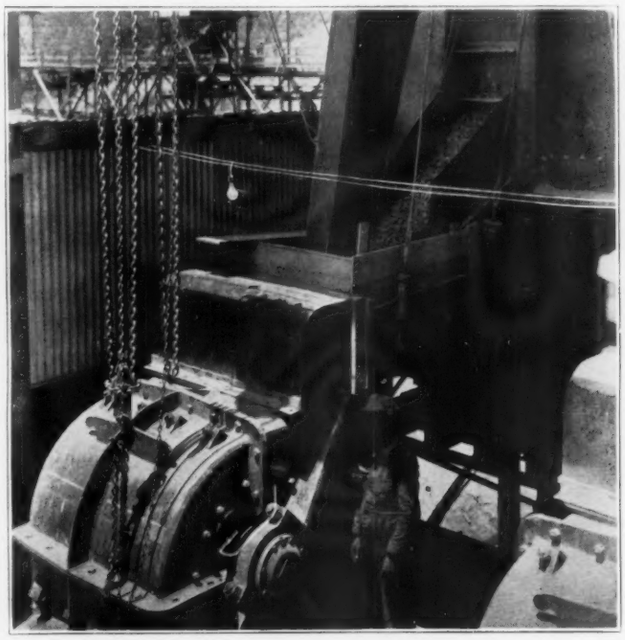
J. R. Wallis, Dubuque, Ia., in 1934 completed a new crushed-stone plant with new Niagara vibrating screens and crushing and conveying equipment. Facilities were installed for car, truck and barge loading.

The Limestone Products Co., in 1934 put into operation a $15,000 plant for the production of ground limestone near Dallas, Ore. It has a capacity of 10 tons per hr. of this material.

The Momence Stone Products Co. late in 1934 completed a new plant at Kankakee, Ill., for the production of crushed stone and agricultural limestone.

It has a capacity of 60 tons per hr. of the former.

The Louisiana Lime Products Co., Easton, La., which in 1934 completed a new lime plant, also erected facilities for the production of 30 tons of crushed stone and 6 tons of agricultural limestone hourly. The equipment used for this purpose in-



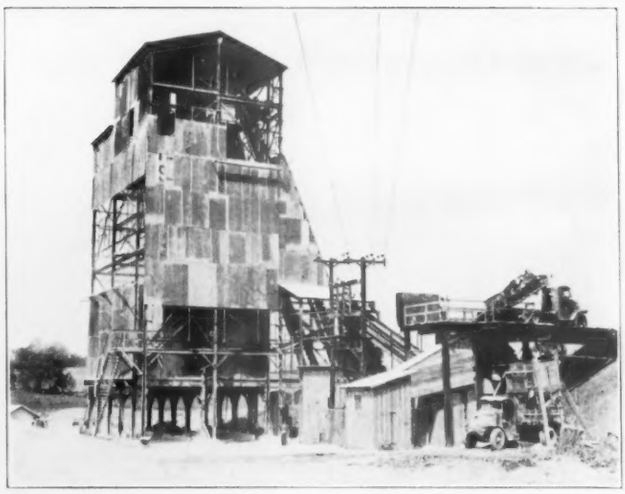
One of the two pulverizers which produce stone sand at the T. V. A. Norris Dam plant. Electric vibrating feeder above.

cludes two jaw crushers, Allis-Chalmers and Tyler Hum-mer vibrating screens, an Allis-Chalmers No. 2 Pulverator, a rotary drier, conveyors and elevators.

M. M. Thomas, a veteran producer, in 1934 completed a new plant for the production of flint rock at Zuber, near Ocala, Fla. The equipment includes two Acme jaw crushers, a revolving screen, conveyors, elevators, electric motors, etc.

The Columbia Quarry Co. in 1934 enlarged and improved its plant at Chester, Ill. Two Stephens-

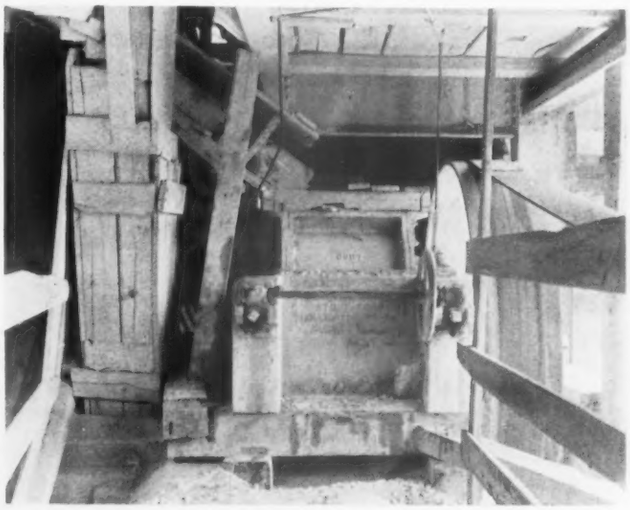
The stone-crushing and screening building of the Louisiana Lime Products Co. viewed from top of incline to lime kilns.



The new crushed-stone plant of the Allentown Portland Cement Co. Truck discharging quarried stone at right.

Adamson vibrating screens, conveyors, elevators, bins, etc., were installed for the production of commercial stone and agstone. A gasoline clam-shell crane was purchased and trucks for quarry haulage and a power-generating plant were installed.

In the same year this company purchased four Ford trucks for deliveries from its plant at Columbia, Ill. A Niagara vibrating screen was installed in this plant in 1930 and four Niagara screens were added to the plant at Krause, Ill. In 1930 the com-

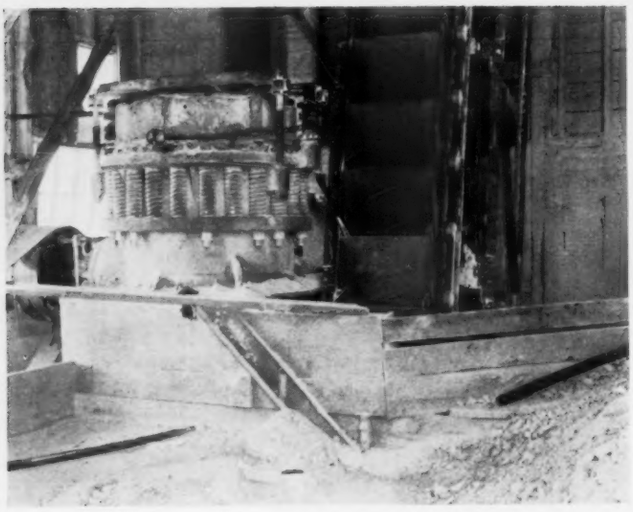


The double-roll crusher in the plant of the Romesberg Stone Co. at Atlantic, Pa.

pany also erected a new stone-storage and distributing plant at East St. Louis, Ill., and enlarged and improved its facilities in St. Louis, Mo.

The Union Quarries Co., Inc., in 1934 made extensive improvements to its plant near Van Wert, O. A Webster 65-ft. bucket-elevator with a capacity of 300 tons per hr. and a Niagara vibrating screen were installed. In 1930 a 3-ft. Symons cone crusher had been added.

The Trap Rock Co. has carried on an extensive improvement program at its plant at Dresser Jct., Wis. In 1930 six Allis-Chalmers vibrating screens



Cone crusher and bucket-elevator in plant of Union Quarries Co. near Van Wert, O.

were installed. From that time up to 1933 additional equipment was added, including the installation in 1933 of two No. 48 Allis-Chalmers Newhouse crushers and conveying and elevating equipment of the same make.

Yoch & Roberts, crushed-stone producers of Norristown, Pa., in 1934 installed a complete Northern Blower Co. dust-collecting system in their plant.

Jigger vibrating screens were included in the new equipment installed in 1934 in the Libertyville, Ill., plant of the North Shore Material Co. At Branch, Pa., the Mercer Lime & Stone Co. added equipment at its lime plant to allow the production of pulverized stone.

The Kingston Trap Rock Co. in August, 1933, completed a new all-steel and concrete crushed-stone plant near Kingston, N. J., with a capacity of over 300 tons per hr. The quarry equipment consists of well-drills and Marion 2-and 1½-cu.yd. electric shovels. Four Mack 6-ton trucks haul the material to the plant. Crushing is done by a Farrel-Bacon 42-in. by 60-in. jaw primary unit and two

The plant of the Springer Stone Co. near Pattersonville, N. Y. Primary crusher building is at left.

belt-conveyor feeds from storage to the loading plant, where a Niagara screen is used to wash the product. In 1934 a Kennedy-Van Saun No. 19 gyratory crusher was installed for additional fine reduction along with incidental conveyors, etc. A Sullivan angle-compound air-compressor was also installed.

Heumader Quarries, Inc., in 1933 put into operation a new crushed-stone plant of 70-ton per hr. capacity near St. Joseph, Mo. It is a hill-side plant smaller secondary units. A Robins vibrating scalping screen is used. A Research Corp. dust-collecting unit collects at the discharge of each crusher to a bin. Belt-conveyors feed two Robins vibrating sizing screens over the Kern tower, which utilizes a Sauerman 1½-cu.yd. Crescent scraper. A tunnel

New plant of the Kingston Trap Rock Co., near Kingston, N. Y. Screening and storage tower is at right and crushers with dust-collector at left.

with a mine in a ledge above the plant. Allis-Chalmers primary and secondary gyratory crushers and a rotary screen comprise the important equipment. The feature of this plant is the power-plant, which generates electricity for all operations. A 150-hp. Fairbanks-Morse Diesel engine drives a generator of the same make. A Sullivan compressor is driven by a 120-hp. engine.

Otsego Quarries, Inc., a subsidiary of Eastern Rock Products, Inc., in April, 1933, completed a new 50-ton per hr. crushed-stone plant near Springfield, N. Y. The quarry equipment includes a Loomis well drill and a Koehring 1-cu.yd. gasoline shovel. Two Packard and one White trucks haul the excavated material to the plant. The crushing equipment consists of two Acme jaw crushers and a Kennedy-Van Saun No. 25 gearless gyratory unit. A Niagara vibrating screen is used as a scalper and a Telsmith revolving screen and two Niagara vibrators do the sizing. A Barber-Greene loader recovers the material from stock-piles.

Eastern Rock Products, Inc., in 1930 also greatly improved its plant at Sterling Creek, N. Y., by the installation of new crushing and washing equipment.

The Tide Water Stone Co., New Port Richey, Fla., in 1933 put into operation a new crushed-stone plant with a capacity of 50 tons per hr.

Another new flint-rock plant was put into operation in 1933 by the Florida Trap Rock Products Co.

at Zephyrhills, Fla. This plant has a capacity of 40 tons per hr. and is said to have cost $40,000. The equipment includes a Traylor jaw primary crusher, an Allis-Chalmers gyratory secondary unit and a roll-crusher. An 80-hp. Primm oil engine drives the plant and a Chicago Pneumatic air-compressor.

The Springer Stone Co. in March, 1933, completed a new 125-ton per hr. crushed-stone plant near Pattersonville, N. Y. The crushing equipment consists of an Allis-Chalmers 40-in. by 42-in. primary jaw crusher, a secondary gyratory unit of the same make and a Kennedy-Van Saun No. 25 gearless gyratory crusher. A Robins vibrating screen serves as a scalper and three Robins screens are used for sizing.

The Buffalo Crushed Stone Co. in 1933 completed its new plant near Buffalo, N. Y. The equipment includes two Robins vibrating screens and belt-conveyors of the same make.

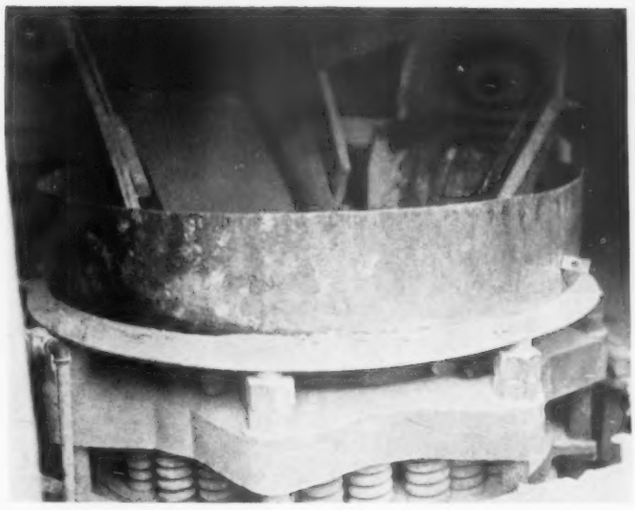
The Central Rock Co., which late in 1929 built a new crushed-stone plant at Lexington, Ky., in 1933 installed equipment for the production of stone sand and pulverized limestone. The equipment installed for this purpose included a Telsmith Gyrasphere crusher, two Columbus sand-drags, two Telsmith vibrating screens, a Hum-mer screen and conveyors and elevators. A Barber-Greene stock-pile loader was also purchased. In 1932 a new quarry

The new plant of Heumader Quarries Inc. near St. Joseph, Mo. Conveyor from mine level is at upper left.

was opened and three Mack 5-ton trucks were added to the three already in use.

The Wagner Quarries Co. in 1933 installed equipment in its plant at Sandusky, O., for the production of stone sand. The equipment installed includes two Wood Auto-Vortex classifiers, a Morris 5-in. slurry pump, a Webster screw-washer and a Niagara vibrating screen.

The Concrete Materials Co., Saugus, Mass., in 1932 took over the existing sand-and-gravel and crushed-stone facilities of the Saugus Sand & Stone Co. This company had improved its crushed-stone facilities in 1930 by the installation of a New England 42-in. by 48-in. primary jaw crusher. In 1932 the gravel plant was rebuilt and late in 1933 new crushed-stone facilities were added. A 2-cu.yd. Ma-



The top of the spherical-head reduction crusher installed in the plant of the Central Rock Co., Lexington, Ky.

rion 480 electric shovel was added in the quarry and a revolving screen and conveyors in the plant. A capacity of 100 tons per hr. of crushed stone is now obtained.

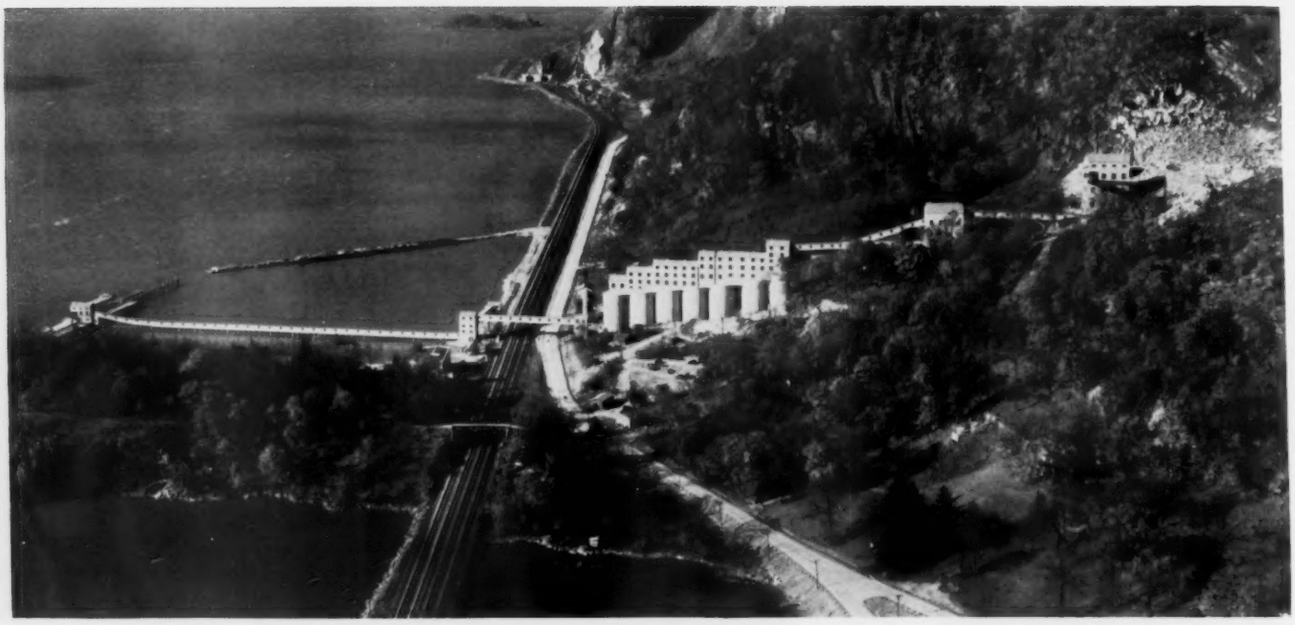
J. E. Osborn & Son, Belle Center, O., in 1933 improved its plant and increased its capacity to 30 tons per hr. A Deister Plat-O vibrating screen, a Niagara gyrating tube scrubber and a New Holland double-roll crusher were the important equipment added.

The Worlock Stone Co., in 1933 installed a $15,000 washing plant alongside its crushed-stone plant at Conastota, N. Y. This has a capacity of 100 tons per hr. The equipment includes a Niagara gyrating tube scrubber and vibrating screen, a Columbus drag-box and conveyor.

The Penry Stone Co. in 1933 improved its plant at Radnor, O., by the installation of a new crusher and Simplicity vibrating screens. Motor trucks replaced railway haulage in the quarry.

The New Castle Lime & Stone Co. in 1933 leased the property of the Kittanning Limestone Co. at Kittanning, Pa., and made a number of improvements which doubled the capacity of the plant. New

The new plant of Otsego Quarries, near Springfield, N. Y. The two jaw crushers at quarry level are at extreme left.



Aërial view of the plant of the Hudson River Stone Corp. at Cold Spring, N. Y. Note the downhill lay-out of plant from quarry at right to boat-landing dock at extreme left and conveyor crossing main line railroad.

crushers, screens, belt-conveyors and elevators were installed and a new river dock was built.

The National Lime & Stone Co. in 1933 enlarged and improved its fine-reduction plant at Carey, O. A Bartlett-Snow drier, vibrating screens, etc., were installed. A Symons vibrating screen was installed in its plant near Marion, O. In 1930 this company doubled the capacity of its plant at Arlington, O .

In November, 1932, the Hudson River Stone Corp., a subsidiary of O'Brien Bros., Inc., put into operation a trap-rock plant near Cold Spring, N. Y., on Hudson River. The plant is of all-steel and concrete construction and is designed to take advantage of its side-hill location. It has a capacity of 1,000 tons per hr. of commercial crushed stone.

The quarry equipment consists of well and drifter drills, an Osgood 1½-cu.yd. shovel and a Marion Model 125 steam shovel. Three Mack trucks with Easton 10-cu.yd. side-dump bodies haul stone to the plant. A feeder passes the stone to the 56-in. by 72-in. Traylor Bulldog primary jaw crushers; the secondary crushing units are Traylor BH gyratories. Two Traylor revolving screens are used for scalping. The coarse material goes to three finishing gyratories. A series of 16 Niagara vibrator screens size the stone which is stored in 40-ft.-diameter concrete silos. Traylor wash-boxes are used.

Electric shovel loading truck in quarry of Concrete Materials Co. at Saugus, Mass.

A feature of this operation is the power-plant. Three 660-hp. McIntosh & Seymour Diesel engines drive 500-kw. generators which supply power for all the operations. The entire plant, with the exception of this power-plant, was designed by the Traylor Eng. & Mfg. Co., which also supplied crushers, feeders, speed-reducers, scalping screens, etc. General Electric motors, generators and electrical equipment and Chain Belt conveyors are used.

Electrification was completed in 1933 at the plant of the Iowa Limestone Co., Alden, Ia. The Mausdale Quarry Co., Danville, Pa., leased deposits near Williamsport and erected a plant in 1933 with a daily capacity of 500 tons. A small operation at Blue Ball, Pa., owned by J. C. Showalter began production. Niagara vibrating screens were used to size all material. Screens of the same make were used in the new plant opened in 1933 by Kelly Run Stone Co. at Wilkes Barre, Pa. A semi-portable plant was erected by Imperial Rock Corp., Los Angeles, to supply needs of highway builders.

A 50,000-ton plant was opened near Sunbury, Pa., in the summer of 1933 by the Central Builders Supply Co. A new quarry and plant went into operation in July, 1933, near Connellsville, Pa., owned and operated by the Connellsville Bluestone Co. Its capacity was 200 tons per day. The Eldred Crushed Rock Co., Eldred, Ill., started producing at a new deposit near Jacksonville, Ill.

Harding & Sims revamped their crushed-stone plant at Shoals, Ind., in 1933 with new elevators, crushers and Plat-O vibrating screens. Robins Gyrex screens were installed at the plant of Suffern Stone Co., Suffern, N. Y. At Bluffton, Ind., the

Heller Stone Co. removed its quarry tracks and began hauling material to the crushers by motor truck. A Lima shovel was put in service at the quarry of the John W. Karch Stone Co., Celina, O.

The Greene County Crushed Stone Co., Cairo, N. Y., in August, 1932, completed a new plant with a capacity of 30 tons per hr. A Caterpillar tractor equipped with a bulldozer removes the overburden from the deposit. Two Koehring wheeled Dumptors haul the sized material to the stock-piles from which they are reclaimed by a General Excavator $\frac{5}{8}$-cu.yd. shovel and a Barber-Greene stock-pile loader. The entire plant was operated by a 150-hp. LeRoi gasoline engine. The plant was completely rebuilt and enlarged in 1934. The new equipment consisted of a Kennedy-Van Saun gearless gyratory crusher, a 30-ton truck-scale, a gasoline crane, a washing system and a new system of conveyors, screens and elevators.

In 1932 Larimer & Shaffer, Inc., built a new 100-ton per hr. plant at Cedar Rapids, Ia. The quarry equipment includes an Armstrong well drill, a Thew Lorain 75A gasoline shovel and two 10-ton Koehring Dumptors. The plant equipment includes an Allis-Chalmers 36-in. by 60-in. primary roll-crusher, two gyratory secondary units, revolving scalping and sizing screens and a Simplicity vibrating screen.

The Dubuque Stone Products Co., Dubuque, Ia., in 1932 erected a washing plant with a capacity of 150 tons per hr. The equipment includes a Stephens-Adamson revolving washing screen, a Butler 40-ton bin and a 3,000-lb. weighing batcher, belt-conveyors, etc.

The A. H. George Stone Co. in 1932 remodeled both its plants at Andersonville and Gray's Falls, Ind. At Andersonville an Allis-Chalmers No. 3 gyratory crusher, and conveyors and elevators were added. At Gray's Falls a Telsmith No. 3 gyratory crusher and other equipment were installed.

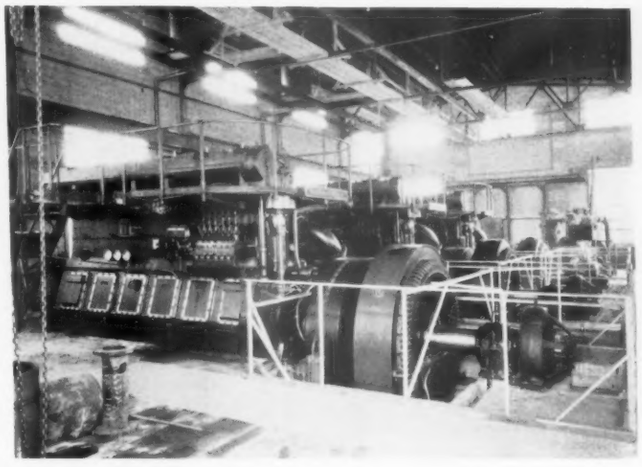
The Waukesha Lime & Stone Co. between 1930 and 1932 installed six new Allis-Chalmers vibrating screens in its plant at Waukesha, Wis.

In its quarry the Big Bend Quarry Co., St. Louis, Mo., in 1932 installed a new skip-hoist which elevates 200 tons of material per hr. from the quarry floor a height of 200 ft. to the plant.

Gasoline shovel loading dump tractor at plant of Larimer & Shaffer, Inc.

The Genesee Stone Products Co. in 1932 made extensive additions and improvements to its plant at Stafford, N. Y. The recrushing and scalping departments were improved, the screening and storage building was completely rebuilt and a washing plant was added. A Niagara vibrating screen is used for scalping and 7 Niagaras for sizing. The plant's capacity was increased to 200 tons per hr.

The Missouri Portland Cement Co. in 1932 rebuilt its crushed-stone plant at Sugar Creek, Mo. Additions made to the plant included a Robins vibrating screen and a new car-loading system which reduces the amount of segregation. Conveyors and truck-loading bins were also added.



The three 660-hp. Diesel engines which generate power for all operations of the Hudson River Stone Corp.

A new plant opened in 1932 near Burley, Ia., by the Intermountain Mineral Products Co., produced both crushed and pulverized stone. Farther west, A. C. Root, for many years a producer of crushed stone at Woodlake, Cal., invested $125,000 in making improvements to raise his output to 1,000 tons per day. Plant enlargements in progress in 1932 by Narehood Bros., Milton, Pa., were designed to double production, the plant being converted to electrical operation at the same time. Commercial aggregates and agstone were produced at the plant of the Diamond Limestone Co., opened in 1932 at Huntington, Ind.

Agricultural stone accounted for most of the output of the new plant of the Lime Products Mfg. Co., completed in the autumn of 1932 near Salem, Ore.

Near Glens Falls, N. Y., a new and modern crushed-stone plant owned by the Amsterdam Stone Crushing Co. began producing in 1932. Trucks replaced locomotives and cars in the quarry of the Lutz Stone Co., Oshkosh, Wis., while the company's plant was improved by the addition of Allis-Chalmers and Universal vibrating screens.

The Tennessee Coal, Iron & Ry. Co. during this period erected two new crushed-stone plants to supply fluxing stone and stone to be used for the manufacture of lime to be used in its extensive open-hearth and blast-furnace operations in and near Bir-

Plant of the Tennessee Coal, Iron & R. R. Co. at Muscoda, Ala. Tipple from limestone mine is at right.

mingham, Ala. None of this stone is sold on the market.

The first of these plants went into operation in April, 1931, at Muscoda, Ala., and has a capacity of 130 tons per hr. The most interesting feature of this operation is the mining of the stone. An old iron-ore slope was utilized for haulage to the surface. At a point about 950 ft. below and 2,100 ft. horizontally back from the opening of this slope a pocket raise was opened to the limestone stratum 350 ft. above this point. A limestone slope and mining levels and stopes were then developed. Stone is mined in these stopes and is placed by eight mechanical scraper loaders in tram cars in the levels which in turn unload into skip cars in the limestone slope. These are hauled up the slope and dumped into the pocket raise. Air gates discharge the stone into a 10-ton skip car which is hauled 2,400 ft. to the surface. The major plant equipment includes a 40-in. by 48-in. jaw crusher, a vibrating scalping screen, a 5½-ft. cone crusher, and two vibrating washing screens.

The fluxing-stone plant at Dolonah, Ala., went into operation in June, 1931. A 3-cu.yd. electric shovel loads stone into 10-ton quarry cars which are hauled by a 10-ton steam locomotive and a hoist pulls the cars up the quarry incline to the plant. The plant equipment includes a 42-in. primary gyratory crusher, a No. 8 gyratory secondary crusher, a 42-in. by 16-in. roll-crusher, and five vibrating scalping, sizing, washing and dewatering screens.

The Kelley Island Lime & Transport Co. in 1931 installed a new fine-crushing and screening plant at White Rock, O., to supplement its lime and fluxing-stone operations there. This plant was at that time and still is one of the best-engineered units of its type in the crushed-stone industry. Stone is taken from the primary crushing plant by a feeder and conveyor to a series of three vibrating screens and coarse sizes are discharged to storage. An optional flow allows this stone to be reclaimed and further reduced by a Symons 4-ft. short-head cone crusher to be again passed over these screens. Fine sizes are also stored but an optional flow allows them to be passed through a rotary drier and over a fourth screen before being stored. The Stephens-Adamson Mfg. Co. furnished practically all the equipment used in this plant.

Geo. M. Brewster & Son, Inc., in 1931 rebuilt its crushed-stone plant at North Bergen, N. J., on such an extensive scale that it is practically a new plant. The plant has a capacity of 250 tons per hr. and was designed and built by the Burrell Eng. & Const. Co.

The quarry equipment consists of Sanderson Cyclone electric well drills, a Northwest gasoline crane and a 2½-cu.yd. Marion 490 electric shovel. Two Mack trucks with 7½-cu.yd. Easton Phoenix side-dump bodies haul the rock to the plant. The primary crusher is a Farrel-Bacon 42-in. by 60-in. jaw machine, and scalping is done by a Robins vibrating screen. The oversize goes to a Symons 5½-ft. cone crusher and coarse sizing is done by two Robins screens. The oversize is recrushed by an Allis-Chalmers Newhouse unit and final sizing is done by two more pairs of Robins vibrators. A truck batching building, which consists of a Blaw-Knox 300-ton steel bin, and a weighing batcher of the same make was also erected. The company also operates a complete material yard at Bogota, N. J. A new stone-washing plant with a capacity of 100 cu.yd. per hr. was erected there in 1931.

The largest new crushed-stone plant of 1931 is that of the Thunder Bay Quarries Co. near Alpena, Mich., which went into operation in September of that year. Six sizes of stone are produced for boat delivery to industrial markets and the hourly capacity is 1,000 tons. A large electric shovel loads the stone into six Koppel 25-cu.yd. air-dump cars which are hauled to the plant by steam locomotives. The crushing and scalping equipment consists of a Traylor 60-in. gyratory primary crusher, a Link-Belt 60-in. grizzly and a Traylor 36-in. by 60-in. double-roll crusher. Sizing is done by six Niagara vibrating screens and recrushing by a Symons 5½-ft. cone crusher. A Brownhoist boat-loading dock is used and Merrick Weightometers weigh all material entering and leaving the plant. The Link-Belt Co. furnished all the belt-conveyors, feeders and speed-reducers. The 650-ft. boat-loading dock alone cost $85,000 exclusive of equipment.

Early in 1932 three 504-ft. steamers were converted into 10,000-ton capacity self-unloading boats to handle the product of this plant. These boats are of the hopper type. In each boat two belt-conveyors collect the material from the hoppers and deliver

The fine-crushing and screening plant of the Kelley Island Lime & Transport Co. at Clay Center, O.

it to cross conveyors and a pan conveyor elevates it to the boom conveyor. The Robins Conveying Belt Co. supplied all the conveying equipment, belts and drives and the General Electric Co. all the motors and other electric equipment. Power is supplied by a Westinghouse turbo-generator. Two 4-in. Morris dredge pumps drain the hold.

The G. D. Francey Stone & Supply Co. in 1931 erected a new plant at Wauwatosa, Wis., which has a capacity of 60 cu.yd. per hr. Power for all its operations is generated by two Fairbanks-Morse 200-hp. semi-Diesel engines connected to generators of the same make. Stone is loaded by a 1¼-cu.yd. Koehring Model 501 electric shovel into a 7½-ton Mack truck. This hauls the rock up a ramp to the Allis-Chalmers No. 12 gyratory primary crusher, the product of which is scalped by an Allis-Chalmers vibrator and further reduced by a 7-in. Newhouse unit. At the screening building, sizing is done by an Allis-Chalmers vibrating screen. Stone is loaded from bins direct into trucks or from stockpiles by a P&H gasoline crane and a Barber-Greene loader. Five Sterling trucks make deliveries.

The Louisiana Quarry Co. in 1931 completed what was said to be the only commercial crushed-stone plant in the state at Winnfield, La. This plant has a capacity of 300 tons per hr. Under an agreement with the Southern Mineral Co., owner of the property, the plant became the property of that company in 1932. The overburden is removed by a Thew Lorain 75 gasoline drag-line and drilling is done by a Sanderson Cyclone well drill. Two steam shovels load the stone into five Hug Roadbuilder trucks having 12-cu.yd. Easton end-dump bodies. The crushing and scalping equipment consists of a 27-in. Allis-Chalmers gyratory primary crusher, two vibrating screens of the same make and two 10-in. Newhouse crushers. Three 20-ft. Allis-Chalmers rotary scrubbers feed a series of three and two vibrating sizing screens. Another screen washes the stored finished product before loading.

The Hopkinsville Stone Co., Inc., in June, 1931, completed a new crushed-stone plant of 100-ton per hr. capacity at Hopkinsville, Ky. The equipment consists of a 15-in. gyratory primary crusher, a revolving scalping and coarse sizing screen, a 3-ft. Symons cone crusher and a Niagara fine-sizing screen. This plant, according to company officials, cost $75,000.

A small plant for supplying road material was erected and put into operation in the spring of 1931 by the Winterset Limestone Co. at Winterset, Ia. The Taylor Stone Co. rebuilt its plant at Ada, O., following a destructive fire early in 1931. The new operation had a capacity of 250 tons daily. J. L. Shiely Co., St. Paul operator, put a plant into operation at Mendota, Minn., in the autumn of 1931 to supplement production at the company's large plant near the twin cities.

Gottlieb Keil opened a crushed-stone plant at Hudson, N. Y., in May, 1931. Capacity was increased in later years and the firm is now known as the Keil Stone & Gravel Corp. With $70,000 worth of equipment installed, St. Joseph Quarries Co. began operations on a new 1,200-tons-per-day plant near St. Joseph, Mo., late in the summer of 1931. Texas Quarries Co. began producing crushed granite from its new operation at Kingsland, Tex., northwest of Austin.

The Boscobel Granite Quarries, Inc., in 1930 purchased a plant at Manakin, Va., which was so completely rebuilt and enlarged that when it went into operation in 1931 it was actually a new plant. Stone is now hauled to the plant in 10-ton Fruehaul trailers drawn by International 10-20 tractors. The new plant equipment includes a Symons cone crusher, four Niagara vibrating screens and 300 cu.yd. Johnson steel storage-bins. Steam power was also supplanted by individual electric-motor drives.

The Bethlehem Mines Corp. in 1931 completed the

Truck being loaded with stone in quarry of G. D. Francey Stone & Supply Co. at Wauwatosa, Wis.

construction of a new plant for the production of fluxing and commercial stone and stone sand. This plant is of all-steel and concrete construction and is reported to have cost $1,000,000.

The Borrman Stone Products Co. in 1931 completed at Norwood, N. Y., a new crushed-stone plant with a capacity of 180 tons per hr. In 1932 additional crushing and screening equipment was installed. In 1933 the company changed its name to Northern Quarries, Inc.

T. C. Hubbert & Co., Wilmington, Del., in 1931 completed extensive improvements to their crushed-stone plant near that city. Early in that year a 4-ft. by 8-ft. Niagara scalping screen with 9-in. by 9-in. openings was installed to separate stone up to 250 lb. weight from that going to the crushed-stone plant. Later in the year four additional Niagara sizing screens were installed to replace revolving screens and the screening building was rebuilt.

The Marble Cliff Quarries Co. early in 1931 completed the remodeling of its plant X near Columbus, O. This now has a capacity of 750 tons per hr. of fluxing and chemical stone and facilities for washing all material under 2¾ in. The new equipment includes seven vibrating screens, a live-roll grizzly, two 30-in. log-washers, and conveyors.

The Saginaw Lime & Stone Co., Saginaw, Ala., in 1931 installed facilities for the production of 50

tons per hr. of crushed stone at its lime plant. The equipment includes a jaw crusher, revolving scalping and sizing screens and storage-bins.

One of the features of 1930 in the crushed-stone industry was the completion of the new 750-ton per hr. plant of the Inland Lime & Stone Co. at Port Inland, near Manistique, Mich. The quarry equipment includes Armstrong electric well drills and two 5-cu.yd. Bucyrus-Erie 170B electric shovels. The latter load fourteen 30-cu.yd. Koppel side-dump cars which are hauled to the plant by two Differential Steel Car Co. electric-trolley locomotives. The crushing equipment comprises an Allis-Chalmers 60-in. primary gyratory crusher and two secondary units, an Allis-Chalmers 20-in. gyratory and a Symons cone. Two live-roll grizzlies are used for scalping and sizing is done by six vibrating screens.

The various sizes of stone are stock-piled by means of four stackers which are movable towers 60 ft. high running on tracks and moved by 40-hp. motors. Each stacker has a 60-ft. loading boom on which is mounted a stock-piling conveyor. Stone is reclaimed from stock by tunnel belt-conveyors feeding a cross tunnel conveyor. A loading belt-conveyor provided with a Merrick Weightometer weighs the stone as it is carried to the boat and car-loading tower. The entire plant was designed and built by the Stephens-Adamson Mfg. Co. which also supplied most of the equipment. Allis-Chalmers electric motors and Falk speed-reducers are used throughout the plant and a total of 20,000 Timken bearings are in use. In 1934 an additional Stephens-Adamson live-roll grizzly with five 24-in.-diameter rolls was installed.

One of the country's leading crushed-stone plants is that of the New York Trap Rock Corp. at Stoneco, N. Y., which went into operation April 18, 1930 and has a capacity of over 600 tons per hr. of commercial crushed stone. Provision was made in its design for doubling its capacity by the installation of additional equipment.

In the quarry are 10 electric well drills, a Bucyrus-Erie 100B electric shovel and three 50B steam shovels of the same make. These load 12 Mack trucks having Easton 5-cu.yd. side-dump bodies. Primary crushing is done by an Allis-Chalmers No. 21 gyratory and secondary reduction by two Symons 7-ft. cone crushers having Traylor apron feeders. Scalping was done by four Allis-Chalmers revolving screens and two Robins vibrators all with similar feeders. Norblo dust collectors keep the primary and secondary crushing buildings clean. The screening building is mounted on eight 50-ft. by 80-ft. concrete storage-silos. Twenty Robins Gyrex and 16 Robins Vibrex screens do the sizing. A tunnel belt-conveyor reclaims stone to the washer building which in turn feeds by belt either to the boat-loading dock or to the car and truck loading storage, which consists of eight 20-ft. by 60-ft. concrete silos. Complete machine, blacksmith and electrical shops, storerooms, etc., were also erected.

The plant was designed by the company's engineering staff and the general plans were prepared by the Burrell Eng. & Const. Co. which was also awarded the general construction contract. Robins conveyors and Falk speed-reducers are used throughout and, with a few exceptions, Allis-Chalmers electric motors. A total of 161 motors totaling 4,056 hp. and 32 belt-conveyors are used. In 1931 the four revolving scalping screens were replaced by four pairs of Robins vibrators.

In 1931 the New York Trap Rock Corp. installed washers at all its six plants for the production of stone sand. An addition was also made to the Haverstraw plant for loading washed and dry-batched stone into trucks. Seven 22 by 60-ft. concrete silos load to trucks.

The Elmhurst-Chicago Stone Co., Elmhurst, Ill., in May, 1930, completed the construction of a crushed-stone plant which utilized only the primary crusher and the quarrying and haulage equipment from the old plant it replaced. This plant has a capacity of 300 tons per hr. The Stephens-Adamson Mfg. Co. designed it and furnished all the

Stripping and drilling operations at plant of New York Trap Rock Corp., Stoneco, N. Y. Plant in background.

screening, feeding and conveying equipment. Crushing is done by the Allis-Chalmers No. 18 primary gyratory crusher and a 5½-ft. Symons cone secondary unit. Scalping is done by a vibrating screen and coarse sizing by three vibrators. Symons 3-ft. and 4-ft. cone crushers are used for final reduction and six vibrators for fine sizing.

The Weston & Brooker Co., one of the largest producers of crushed stone in the South, late in 1930 completed its third plant at Camak, Ga. Many original features were incorporated in the design of this plant which has a capacity of over 200 tons per hr. and is said to represent a half-million dollar investment. The quarry equipment consists of two well drills and two Marion steam shovels. Four Mack trucks with 8-cu.yd. Easton bodies haul the stone to the plant. An American Hoist & Derrick Co. stiff-leg derrick is used to dump the trucks' loads into the Allis-Chalmers 48-in. by 60-in. primary jaw crusher. A 20-in. gyratory and a 4-ft. Symons cone crusher complete the crushing. The latter is fed from a surge-bin by means of a Ross chain feeder. A Niagara vibrating screen and a rotary unit do the coarse sizing and three Tyler

Hum-mer screens the fine sizing. Stone is reclaimed by a tunnel belt-conveyor or by means of a P&H 2-cu.yd. crane. Switching is done by an 18-ton Porter locomotive. In 1934 additional vibrating screens, a surge-bin and feeder were installed at this plant and other improvements were made.

The Hawkeye Portland Cement Co. in 1930 completed a new commercial crushed-stone plant at its quarry at Earlham, Ia., which has a capacity of 150 tons per hr. A Marion 70 steam shovel loads overburden into three Koehring crawler-type Dumptors. A Bucyrus and a Marion shovel load stone into 18 Koppel 8-cu.yd. cars which are hauled to the plant by a Davenport 20-ton steam locomotive. The crushing-plant equipment consists of an Allis-Chalmers No. 30 primary gyratory crusher, a pan conveyor of the same make and two Stephens-Adamson live-roll grizzlies. The latter scalp the oversize to two Allis-Chalmers No. 6 gyratories. Another grizzly and a Hum-mer vibrating screen are used for sizing. A feature is the 335,000-lb. Fairbanks track-scale used for weighing car-load shipments.

The American Stone Corp. in October, 1930, put in operation a new 100-ton per hr. crushed-stone plant at Lima, O. Included in the equipment are a 16-in. Traylor primary gyratory crusher, an 8-in. secondary unit, a 2-ft. Symons cone crusher, and three Huron vibrating screens.

The Bluffton Stone Co., Bluffton, O., in July, 1930, completed an 80-ton per hr. crushed-stone plant. The equipment includes an Allis-Chalmers No. 6 gyratory primary crusher, a Symons 3-ft. cone crusher, and three Niagara vibrating screens.

Another new 1930 plant is that of the Watauga Stone Co., Watauga, Tenn., which has a capacity of 70 tons per hr. Five Mack trucks with 8-cu.yd. Easton bodies haul the stone to the plant. The equipment includes an Allis-Chalmers gyratory primary crusher and two Stephens-Adamson vibrating screens.

The Georgia Lime Rock Co. in 1930 completed a new plant at Clinchfield, Ga. Its equipment consists of a Stephens-Adamson apron feeder and a Williams No. 7 hammer-mill. An older plant is operated by the company at Perry, Ga. In 1930 a 1-cu.yd. P&H gasoline shovel and a 7-cu.yd. Koehring crawler Dumptor were installed.

The Atlantic Lime Rock Corp. in 1930 built a new plant at Sandersville, Ga. The equipment includes a Thew shovel, a Williams W2 Jumbo hammer-mill and Link-Belt conveyors.

The Ocala Lime Rock Corp. in 1930 built a new plant at Haile, Fla., with a capacity of 200 tons per hr. Crushing is done by a Pennsylvania 24-in. by 48-in. roll-crusher, and two Bessemer semi-Diesel engines drive the plant equipment.

F. H. Clement & Co. in 1930 completed a new crushed-stone plant at Comstock, N. Y., primarily for the production of railroad ballast. Two Loomis Clipper well drills are used in the quarry and three Mack 6½-ton trucks haul the stone to the plant. The plant equipment consists of a Traylor 42-in. by 48-in. jaw primary crusher, two Traylor 14-in. secondary gyratory crushers, a Robins vibrating screen, an Ingersoll-Rand air-compressor, and a Vulcan 30-ton steam locomotive.

Blue Rock, Inc., Washington Court House, O., in 1930 completed a crushed-stone plant with a capacity of 50 tons per hr. Hauling is done by three Mack 5-ton trucks. The plant equipment includes a Williams No. 5 hammer-mill, an Allis-Chalmers No. 6 gyratory crusher, and two Niagara vibrating screens.

C. C. Beam, Inc., in 1930 completed a rebuilding program which converted an old crushed-stone plant into one modern in all details. A new building was erected for primary and secondary crushing and scalping. A total of twelve Allis-Chalmers screens were installed and all stone can now be washed. The plant now has a capacity of 1,500 tons daily.

The Mohawk Limestone Products Co. in 1930 improved its facilities for the production and storage of pulverized limestone at its Jordanville, N. Y., plant. The equipment installed included two Niagara vibrating screens, conveyors, and a new pumping and storage system which is described in the lime review in this issue. In 1933 a Niagara gyrating tube scrubber was installed and other improvements made.

The Anna Stone Co. in 1930 built an addition to its plant at Anna, Ill., for the production of agstone and asphalt filler. The equipment installed included an Allis-Chalmers double-roll crusher, a Universal vibrating screen, conveyors, elevators, etc.

The Consumers Co. early in 1930 made extensive changes to its crushed-stone plant at La Grange, Ill., which has a capacity of 600 tons per hr. Important equipment installed included a 7-ft. and two 5½-ft. Symons cone crushers and five Niagara and two Robins vibrating screens.

The Consolidated Quarries Corp., which in 1929 erected a large crushed-granite plant at Lithonia,

General view of plant of Inland Lime & Stone Co., Port Inland, Mich., with boat-loading building at left. Note the four movable towers with stock-piling conveyors.

Ga., in 1930 made a number of general improvements. Sanderson Cyclone well drills replaced the tripod drills used to open the quarry. A ⅝-cu.yd. Garst power-scraper was installed to handle stockpiled material. A Tyler Hum-mer vibrating screen and a reciprocating spreader were installed at the car-loading bins to rinse the material.

Considerable crushing, screening and washing equipment were installed in the Loretto, Pa., plant of the Canoe Creek Stone Co. in 1930. Improvements were also recorded at the following plants: Berks Cast Stone Co., South Temple, Pa.; Holston Quarries Co., Watauga, Tenn.; Mann Co., Norristown, Pa.; and Chas. Price Co., East New Castle, Pa.

Extensive improvements were made at three eastern producing units in 1931. More than $100,000 was spent by the Youghiogheny Crushed Stone Co. to modernize its Casparis, Pa. plant. Crushing and conveying equipment were installed by the York Valley Lime & Stone Co., York, Pa., while crushing equipment and a stone breaker were put into service near the West Englewood, N. J., plant of the West Nyack Trap Rock Co.

A crushed-stone plant owned and operated by the Kelly Trust Co., went into operation in October, 1930, at Ft. Smith, Ark. Its capacity was 50 tons per hr. and was designed and built by the Webb City Foundry & Machine Works, Webb City, Mo. An all-steel plant was built by the Iowa Manufacturing Co. for Washtenaw Rock Products Co. at Manchester, Mich., in the summer of 1930. Niagara screens and Allis-Chalmers crushers were placed in service at the Federal Crushed Stone Corp. plant at Cheektowago, N. Y., as part of an extensive improvement program.

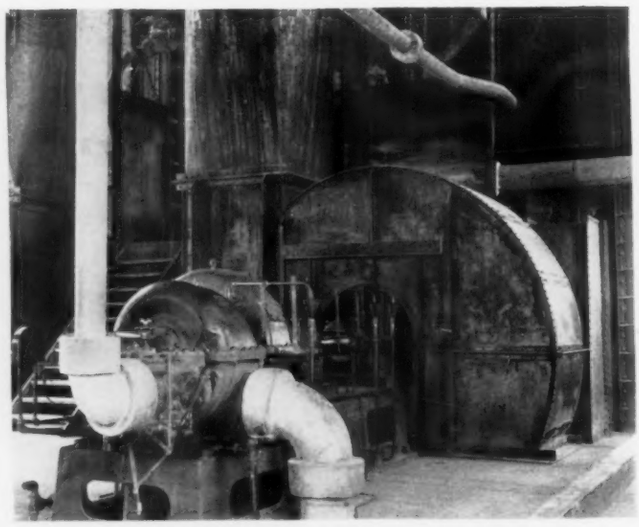
With a daily capacity of 2,500 tons, a new crushing plant owned by the Southern Lime Products Co. went into operation April 15, 1930, at Cordele, Ga. A Marion gas-electric shovel and a Symons cone crusher were 1930 additions to the plant of Lynn Sand & Stone Co., Swampscott, Mass.

A new power plant for the Michigan Limestone & Chemical Co., Rogers City, Mich., was being constructed late in 1930. New concrete-and-steel storage bins were erected and added crushing machinery placed in service by Rock Hill Quarries Co., St. Louis, Mo. The Ash Grove Lime & Portland Cement Co. made changes in its plant at Galloway, Mo., to allow the production of agricultural limestone. Pulverizing was accomplished with a Williams hammer-mill. Allis-Chalmers crushers and shaker-screens were 1930 improvements installed in the plant of Big Rock Stone & Material Co., Little Rock, Ark., to allow the production of a larger variety of sizes.

Cement (from page 50)

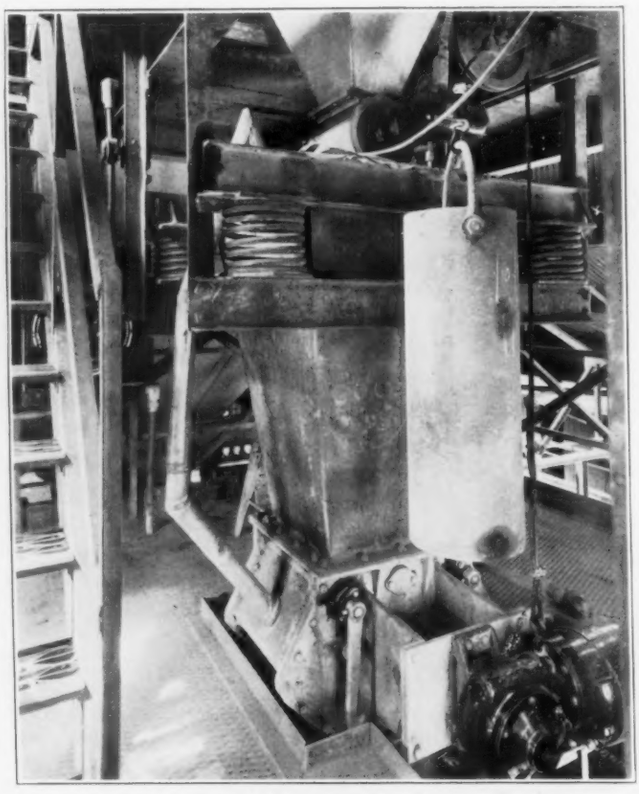
1928. These filters are the Oliver American disk-type with two units of 7 disks each for each of the two kilns. Sullivan vacuum pumps are used in connection and a pug-mill breaks up the filter cake and mixes it with collected dust.

The Trinity Portland Cement Co. in 1930 in-



Steam turbine operating blower in connection with waste heat furnace in background at plant of Nebraska Cement Co.

stalled a new General Electric remote-controlled haulage system in its cement-plant quarry at Eagle Ford, Tex. The system consists of four 10-cu.yd. Atlas steel cars each driven by two 50-hp. G.E. motors. This system operates on a 1-mi. track and is controlled from a tower. Alternating current is used.



The weighing and recording feeder at plant of Coplay Cement Mfg. Co. with control-board in left background and feeder to low-pressure pumps below.

Sand-and-Gravel Industry Takes Lead in Number of New Plants Erected

THE sand-and-gravel industry in 1934 continued the upward trend of production which began late in 1933. The total for the year will, however, be far below the peak years of 1928 and 1929. Government figures show an increase of 28.3 per cent. in the railroad shipments of sand and gravel in 1934 over the preceding year and an increase in water shipments also. Truck shipments undoubtedly also showed improvement largely because of the great amount of secondary road work done during the year. Prices showed a general improvement over 1933 and 1932 but were spotty and in many sections remained below a fair profit level.

Contractor and government-operated plants, mostly portable, continued to be the chief impediment to a return of normal conditions in the industry. In the last few years, however, commercial producers have been combating this situation by erecting and operating such plants and retrieving a good share of the business formerly lost.

The number of new commercial sand-and-gravel plants erected in 1934 showed little or no increase over the two preceding years and most of the plants built were comparatively small in size. This was in sharp contrast to 1930 and 1931, when some of the largest plants in the industry went into operation. Plant improvements have been on the increase, however, indicating that many plants are reaching the point of obsolescence where they must either be abandoned or substantially improved. Increasingly strict specifications and the desire to reduce production costs were also a factor.

Established producers in 1934 received a number of important contracts for governmental work. The Becker County-Shiely Co., a combination of the J. L. Shiely Co. and the Becker County Sand & Gravel Co. was awarded a contract for 2,000,000 cu.yd. of sand and gravel for the construction of the Fort Peck Dam in Montana. This amount has since been increased.

Two identical Link-Belt specially-designed movable plants with a combined daily capacity of 8,000 cu.yd. of washed material were recently placed in operation. Each plant is mounted on rails and consists of two connected buildings having independent traveling mechanisms but a single controller to make them move synchronously. Two Monighan 8-cu.yd. walking drag-lines load the hopper buildings of each plant. A trunnion removes bowlders and the undersize goes by belt-conveyor to the screening building. The sizing is done by four Link-Belt vibrating screens, minus ½-in. material being wasted and sent by flume back into the pit. The ½-in. to 6-in. material is loaded in cars by a 60-ft. boom conveyor. A split chute allows jumping the gap between cars without spilling material or stopping the conveyor. In winter material is screened dry and the waste is returned to the pit by a 90-ft. boom conveyor.

One of the movable plants operated by the Becker County-Shiely Co. to supply aggregates for the Fort Peck Dam.

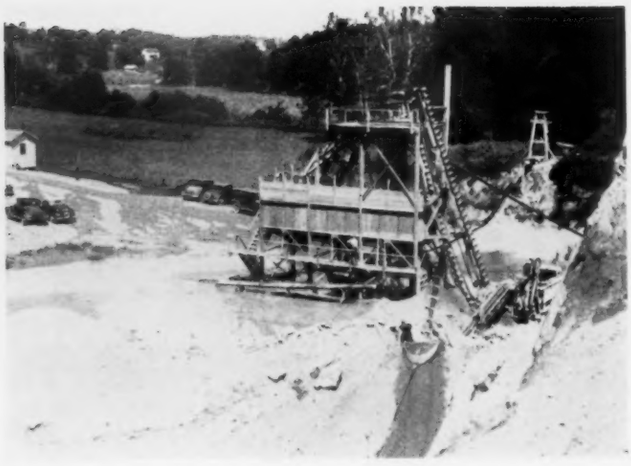
The J. L. Shiely Co. earlier in the year erected a 100-ton per hr. plant for the production of material for the construction of diversion tunnels for the dam. Link-Belt screens, scrubbers, sand cones, conveyors, etc., are used. All these plants ship 75 mi. by railway to the dam site.

The Lancaster Gravel Co. in Feb. 1934 completed a new plant having a capacity of about 20 tons per hr. The equipment consists of a ½-cu.yd. Sauerman Crescent scraper, an Iowa Mfg. Co. portable crushing and scalping plant and a Deister Plat-O vibrating screen.

McElwee & Rogy, Peoria, Ill., in 1934 erected a new plant of 75-cu.yd. per hr. capacity. This was designed by the Stephens-Adamson Manufacturing Co. which also furnished most of the equipment, including vibrating screens and conveyors. A Cedar Rapids jaw crusher was also installed.

H. T. Farrell in February, 1934, put into operation a new sand-and-gravel plant of 100-tons per hr. capacity at Dorothy, Tex. According to reports, this plant will later be considerably enlarged. An interesting feature was the construction of a 1½-mi. siding extending to a near railroad and consisting of a heavy fill, several concrete culverts and a large steel-truss bridge over Trinity River. The new equipment includes a 2½-cu.yd. Bucyrus-Erie 52B Diesel drag-line, a Baldwin 75-ton steam locomotive, four Western 20-cu.yd. air-operated side-dump cars, an Austin-Western crusher, and Jeffrey feeders, elevators, sand-drag, screens and conveyors. The entire plant is operated by a 110-hp. Fairbanks-Morse Diesel engine.

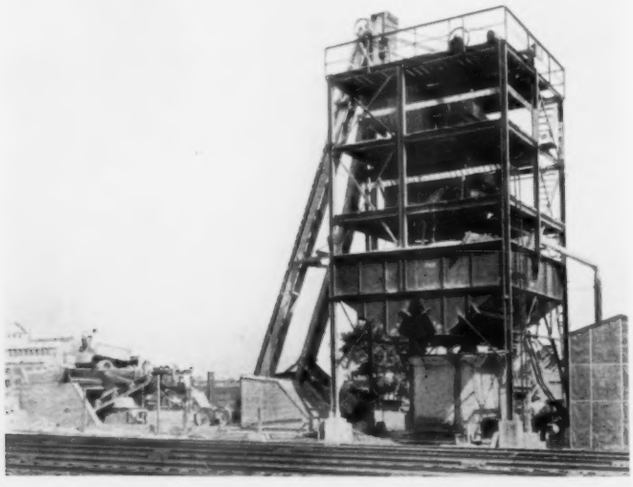
The Wabash Sand & Gravel Co., Terre Haute, Ind., in May, 1934, put into operation a field belt-conveyor installation to replace a dredge pipe-line which had become too long for economical operation. The dredge now discharges to a dewatering station, where excess fines are wasted. The main



New plant of the Lancaster Gravel Co. near Lancaster, O. Drag scraper in operation in foreground.

field conveyor runs on 60-ft. centers and crosses a creek over an 80-ft. span steel-truss bridge. A 158-ft. conveyor discharges to a stock-pile, and a 333-ft. conveyor reclaims the material through a tunnel and inclines to discharge to the plant. The Robins Conveying Belt Co. supplied all the equipment.

T. L. Herbert & Sons, pioneer sand-and-gravel producers of Nashville, Tenn., in May, 1934, installed five 7-ft. by 14-ft. Deister concentrating tables to clean the gravel produced. In 1933 two tables were installed for washing and classifying sand. Both are said to be the first installations of this equipment in this industry. Foreign materials



New sand and gravel plant of McElwee & Rogy at Peoria, Ill. Material is dumped from trucks at left.

which are being successfully removed include organic matter, coal, coke, and other *débris*. Separate concrete-and-steel buildings house the new equipment. Additional equipment includes bins, elevators, belt-conveyors, etc. An American 25-ton steam locomotive crane was also purchased.

New plants were also completed in 1934 by the Penry Sand & Gravel Co., Newmans, O.; C. Wileman & Son, New Manchester, Ind.; O. N. Holder, Meridian, Miss.; the Wissota Sand & Gravel Co., Barron, Wis.; the Eugene Sand & Gravel Co., Eugene, Ore.; the Dillman Industries, Inc., Caruthersville, Mo.; the Silver Hill Sand & Gravel Co., Silver Hill, Md.; the Sand Drying Co., Charleston, S. C.; and the Independence Sand & Gravel Co., Independence, Ore. Portable gravel plants were installed by the Brown-Rosenbarger Gravel Co., Indianapolis, Ind.; and the Portable Gravel Co., Lansing, Mich.

Important improvements were also made in 1934 by many producers including the Neal Gravel Co., Attica, Ind.; the Chillicothe Sand & Gravel Co., Chillicothe, O.; the Mirabel Gravel Co., Santa Rosa, Cal.; the Dixie Sand & Gravel Co., Chattanooga, Tenn.; the Laura Gravel & Stone Co., Phillipsburg, O.; the Bedford Nugent Co., Evansville, Ind.; the Lincoln Sand & Gravel Co., Lincoln, Ill.; the Allegheny River Sand Corp., Reesedale, Pa.; C. C. Kelly, Mishawaka, Ind.; the Hartland Washed Sand &

Dragline loading to cars at plant of H. T. Farrell, Dorothy, Tex.

Gravel Co., Hartland, Wis.; H. O. Baldwin, Willoughby, O.; the Southern Sand & Gravel Co., Selma, Ala.; the Georgia Gravel Co., Columbus, Ga.; the Florida Gravel Co., Chattahoochee, Fla.; the Fieber Gravel Co., Brookville, Ill, and the Estill Springs Sand & Gravel Co., Estill Springs, Tenn.

Burton Canfield, Inc., in 1933 erected a 70-ton per hr. plant of a type which is rapidly gaining popularity among commercial producers. Truck shipments only are made within a limited radius. A Koehring 1-cu.yd. gasoline shovel loads two Mack trucks of 5-cu.yd. capacity. These discharge the material over a grizzly into a hopper from which a feeder and belt-conveyor carry it to a revolving scalping screen. The oversize goes to a 9-in. by 24-in. Cedar Rapids jaw crusher and is returned to the screen by an elevator. Another belt-conveyor feeds a revolving sizing screen mounted on the steel storage-bins. Two drag classifiers prepare the sand.

The Memphis Stone & Gravel Co. early in 1933 completed a new 100-ton per hr. sand-and-gravel plant near Sardis, Miss. The equipment includes a Porter 18-ton steam locomotive, 4-cu.yd. Western dump cars, a Deister vibrating screen and spray nozzles, a La Plante-Choate 7-cu.yd. crawler wagon, a Caterpillar 60 tractor, etc.

A hydraulic dredge-vibrating screen plant of the American Gravel & Sand Co. went into operation in the early summer of 1933 at Plantersville, Ala. Its capacity was 150 tons per hr. It was built adjacent to an older plant which had employed a drag-line

Sand-and-gravel plant of Six Companies, Inc., which supplies aggregates for Boulder Dam. Stockpiles at right are reclaimed through tunnel conveyors. Sand stockpiling conveyors are at extreme left.

excavator and revolving screens. The peculiarities of the deposit had proved the old system to be unsuited to economical production in this instance, the new plant being the result.

During a construction boom at Peoria, Ill., where a number of huge distilleries were being erected, the Lake Erie Mining Co. put an up-to-date plant in operation near that city in 1933. Besides the gravel plant, new storage silos equipped with a rinsing screen, and a concrete-proportioning unit were erected. All three units were connected by a system of storage, reclaiming and handling conveyors which made the entire installation extremely flexible. The Stephens-Adamson Manufacturing Co. designed, built and equipped the entire plant.

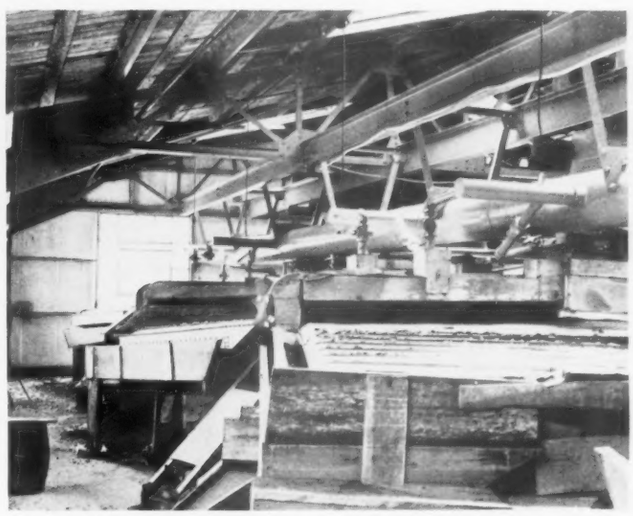
Plant of Wabash Sand & Gravel Co. showing the field-conveyor bridge across creek to stockpiling conveyor.

A 50-ton per hr. operation was started at East Woburn, Mass., in 1933 by Wm. C. Doherty, Inc. The Shenandoah Sand & Gravel Co. also erected a plant in that year, this one being located at Staunton, Va. At Camden, Tenn., a small plant was erected by the Hardy Sand Co. of Evansville, Ind., and near Farmington, Ia., the Douds Stone Co. of Douds, Ia., opened a new gravel plant.

The Carthage Sand Co., Carthage, N. Y., installed a modern sand-and-gravel plant near that city in the spring of 1933. It was designed and equipped by Kennedy-Van Saun Mfg. & Eng. Co.

Plant facilities were established and production at the rate of 25 car-loads daily started at East Carondelet, Ill., by the Cahokia Sand & Material Co., of Brooklyn, N. Y., early in 1933.

One of this country's outstanding sand-and-gravel plants is that of Six Companies, Inc., which was built in 1932 to supply material for the construction of Hoover Dam. This is a steel-and-concrete plant with a capacity of 500 tons per hr., which can be doubled by adding a few pieces of equipment. A 5-cu.yd. Marion electric shovel, Western



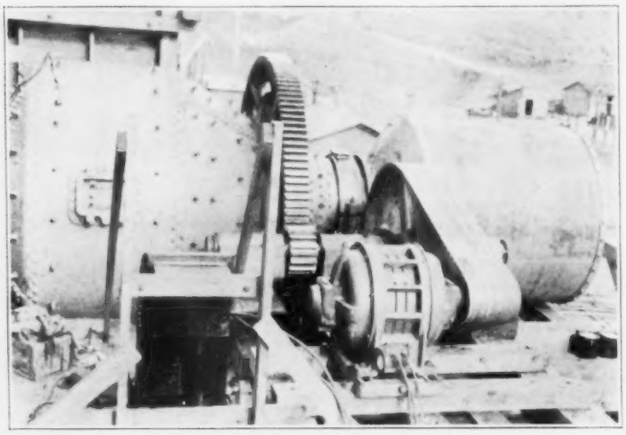
View in plant of T. L. Herbert & Sons, Nashville, Tenn., showing concentrate ends of some of the gravel tables with launders at left.

Plant of the Kaiser Paving Co. at Radum, Cal. Material is crushed and scalped at left, screened and washed in center and rewashed before loading at right.

50-cu.yd. air-dump cars and Plymouth gasoline-electric locomotives constitute the loading and hauling equipment. Crushing and scalping are done by a Bodinson rotary screen and an Allis-Chalmers gyratory crusher, sizing by Robins and Symons vibrating screens. The sand is graded by two Dorrco rake classifiers and a bowl classifier of the same make. Belt-conveyors and trippers discharge gravel to four stock-piles from which it is reclaimed by tunnel belt-conveyors. Sand is stored by belt-conveyors and special airplane trippers.

The Concrete Material Co. was formed in 1932 and took over the sand-and-gravel and crushed-stone plants of the Saugus Sand & Stone Co. at Saugus, Mass. These were torn down and replaced with new equipment, the new 100-ton per hr. sand-and-gravel plant being completed late in 1932. Gravel is obtained with a dredge, whose major equipment consists of a 45-ft. Eagle Swintek ladder, a 12-in. Morris dredge pump and a 350-hp. General Electric motor. The major plant equipment includes Allis-Chalmers Newhouse crushers, and Allis-Chalmers and Stephens-Adamson vibrating screens.

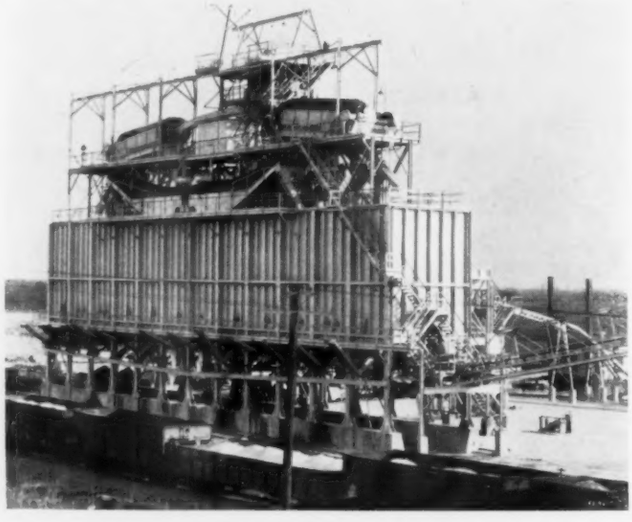
The Kaiser Paving Co. in 1931 built a 400-ton per hr. sand-and-gravel plant at Radum, Cal., one of the most pretentious operations in the industry. Flexibility is one of the outstanding features and provisions were made for doubling its capacity by the installation of additional equipment. Gravel is loaded by shovel into cars which dump into a hopper at the plant. A conveyor feeds a vibrating scalping screen, the oversize being broken in a jaw crusher. Belt-conveyors feed two double-deck vibrating screens at the top of the screening plant. The oversize from these goes to a bin feeding a cone reduction crusher. Sand is removed at several different points in the screening process. The plus ¾-in. and minus ¾-in. gravel is split to two sets of screens for sizing. The sand goes to bowl washers and classifiers arranged to give any desired gradation. Gravel goes to six storage-silos from which it is drawn, one size at a time, to six loading bins. The gravel is washed over vibrating screens under each of these bins and can be blended on a car-loading conveyor to any desired specification.



The conical scrubber in the plant of the Cooley Gravel Co. with attached trommel for rinsing, motor, and V-belt drive.

C. C. Beam, Inc., well-kown Ohio producer, erected a new and modern steel-constructed plant in 1932 on an 80-acre deposit at Clarksville, O. After a $50,000 fire loss, the plant of the Hersey Gravel Co. was rebuilt in 1932. Another plant was built in 1932 to utilize the excellent deposits at Hearne, Tex., by the Texas Construction Material Co. of Houston.

Construction began in April, 1932, and operation started the following August, on a $75,000 plant of Brewer, Brewer & Sons, Inc., on the banks of Scioto River, near Chillicothe, O. More than $30,000 was invested in a new producing unit at Phoenix, Ariz., in the same year by the newly-organized Phoenix Sand & Rock Co. Work was started in March, 1932,



Plant of Curtis & Hill Sand & Gravel Co. near Morris ille, Pa. Dredge is visible in background.

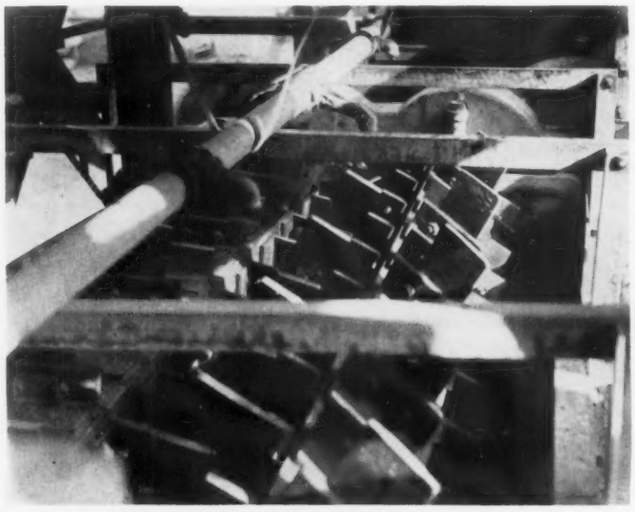
on a plant at Laird, Ark., by the Washed Sand & Gravel Co. of Jonesboro. Its capacity was 30 carloads per day.

Six sizes of material were being produced at the new plant of the Marietta Concrete Co., when it began operating in the early autumn of 1932. The Builders' Material Co., Cedar Rapids, Ia., with two permanent plants, purchased two portable units in 1932 to augment its production facilities. An Atlas-Diesel 110-hp. engine provided power for operating a new plant at Newman, Cal., owned by Frank B. Marks.

Among other outstanding sand-and-gravel plants which began producing in 1932 were those of: I. L. Whitehead, Sault Ste. Marie, Mich.; the California

Rock & Gravel Co., Eliot, Cal.; and the St. Louis Material & Supply Co., St. Louis, Mo.

The Curtis & Hill Gravel & Sand Co. in 1931 completed a 400-ton per hr. plant at Morrisville, Pa. A dredge fitted with a 50-ft. Eagle Swintek screen nozzle ladder and a 15-in. Hetherington & Berner pump feeds material to the plant. A 13-in. gyratory primary crusher, two vibrating scalping screens and two 36-in. cone secondary crushers are used. Two 95-ft. Link-Belt dredging and dewatering elevators discharge to two 6-ft. by 25-ft. revolving sizing screens. Six classifiers are used for sand. The sized materials are stored in twelve 300-ton steel bins or can be fed by a series of belt-conveyors to a stock-pile of 300,000-ton capacity.



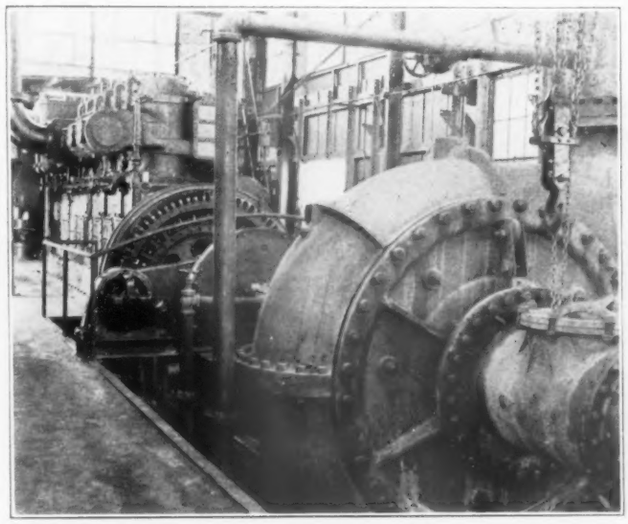
Log washer in operation at plant of Sp ingfield-Pekin Sand & Gravel Co. near Pekin, Ill.

The Twin City Sand & Gravel Co. in 1931 completed a modern new 150-ton per hr. sand-and-gravel plant of steel and concrete construction. A feature of this plant is the Kern tower system of stock-pile storage. The overburden is removed by an American 1¼-cu.yd. drag-line. A 1¼-cu.yd. Bucyrus-Erie shovel loads three 5-ton International trucks for haulage to the plant. A Telsmith plate feeder discharges from the truck hopper on a belt-conveyor which in turn discharges over a grizzly. The oversize goes to a Telsmith 13A gyratory crusher. Grizzly "throughs" go to a 4-ft. by 18-ft. Telsmith revolving scalping screen, and the oversize from this to a Telsmith No. 40 gyratory and a 3-in. by 36-in. Cedar Rapids jaw crusher. All the crushed material is returned to the first conveyor. The material passing the scalping screen goes by conveyor to two 40-in. by 22-ft. Telsmith revolving screens having sand jackets. Sand is diverted to two Telsmith settling tanks. All the sized materials are discharged to seven of the eight compartments of the Kern tower, which has a capacity of 8,000 cu.yd., with the aid of a ¾-cu.yd. Sauerman Crescent scraper. A belt-conveyor reclaims from storage and discharges either direct to cars or to truck-loading bins. In 1932 a boiler and steam coils were installed in these bins to allow shipments in winter. Two additional International trucks are used for deliveries and are weighed on a 40,000-lb. Fairbanks truck scale.

Aërial view of sand storage plant of St. Louis Material & Supply Co. at St. Louis, Mo. Barges are unloaded at left.

One of the most interesting plants in the industry is that of the Makins Sand & Gravel Co. at Sulphur, Okla. This has a capacity of 75 tons per hr. and was built in 1931. The deposit is a firmly-cemented conglomerate which is drilled and blasted as is stone. Secondary blasting is also required. A 1¼-cu.yd. P&H gasoline shovel loads the fragments into three Diamond T 3-ton trucks. A Diamond 15-in. by 36-in. jaw crusher feeds by conveyor to a Simplicity vibrating scalping screen. A 9-in. by 24-in. Diamond jaw crusher is used for secondary reduction. The sizing is done by three Simplicity vibrating screens. A log-washer is used to clean the fine material. Most of the equipment is Telsmith.

The Standard Building Materials Co., now the Missouri Portland Cement Co., in 1931 rebuilt its plant at Jedburg, Mo., on such an extensive scale that it is practically a new plant. A capacity of 500 tons per hr. is obtained. A feature is the new dredge, which is one of the largest in the industry. The 20-in. Morris dredge pump is driven by an 840-hp. Fairbanks-Morse Diesel engine which also generates current for the electric motors. Barges haul



Dredge pump and direct-connected Diesel engine on the dredge of the Missouri Portland Cement Co. at Jedburg, Mo.

Screening and storage tower at the plant of the Missouri Portland Cement Co. at Jedburg, Mo. Drag scraper in foreground.

the material to the plant. The new plant consists of a Kern tower system on which are mounted the eight Telsmith vibrating sizing screens. The tower has seven storage compartments with a total live storage of 3,000 tons. A 2-cu.yd. Sauerman Crescent scraper operated by a 60-ft. head tower on a 250-ft.-radius circular track makes possible a total storage of 300,000 tons.

In 1931, the new plant of the Kansas Sand Co., on Kansas River near Topeka began operating. In California the Piru Rock Co., Ltd., began production with a new plant at Piru, equipped with the latest in equipment 1931 had to offer. The handling of the material was done entirely by conveyors at the new operation of the Sheridan Sand & Gravel Co., at Sheridan, Ill. Another new plant in Illinois in 1931 was that of the Western Sand & Gravel Co., at Spring Valley, where the operator found he could produce material at one-third his former cost by utilizing up-to-date equipment.

Approximately 30 car-loads of material daily was the output at the new plant of Victoria Materials & Gravel Co., at Victoria, Tex. A new processing plant with dock-storage facilities was included in the 1931 improvements made by the Erie Sand & Gravel Co., Erie, Pa. At Douglas, Kan., the Independent Sand-Gravel Co. of Wichita opened a new pit and plant.

Space does not allow reference being made to the several score of other fine plants built in 1931. Some of the outstanding ones, however, were those of the Eau Claire Sand & Gravel Co., Eau Claire, Wis.; the Victory Sand & Stone Co., Topeka, Kan.; the Welch-Sandler Sand Co., Bonner Springs, Kan.; the Woodlawn Gravel Co., San Antonio, Tex.; the Gifford-Hill Co., Searcy, La., and Roanoke, Tex.; the Cast Stone Construction Co., Kingston Lake, Ill.; the Western Wisconsin Sand & Gravel Co., Cochrane, Wis.; the Clearwater Gravel Co., Bagley, Minn.; the Hearne Sand & Gravel Co., Hearne, Tex.; the Terre Haute Gravel Co., Terre Haute, Ind.; and the Santa Paula Rock & Sand Co., Santa Paula, Cal.

The Construction Materials Co., Chicago, Ill., in 1930 put into operation a new self-unloading boat, the *J. R. Sensibar*, which set a new standard. This is the newest of a fleet of five such vessels operated by the company. It is 553 ft. long and has a capacity of 10,000 tons. Two 30-in. sand pumps dredge material from the lake bottom and can also be used for unloading wet materials. Dry materials are reclaimed by belt-conveyors connecting with a 182-ft. boom conveyor.

The new plant of the Construction Materials Co. at Ferrysburg, Mich., has never been completed to its final capacity, but it is operating. When completed this will be one of the largest gravel plants in existence with a capacity of 1,500 tons per hr. Gravel is dredged and hauled to the plant in barges. Sizing is done by 29 vibrating screens. Provision is also made for recrushing the oversize and washing

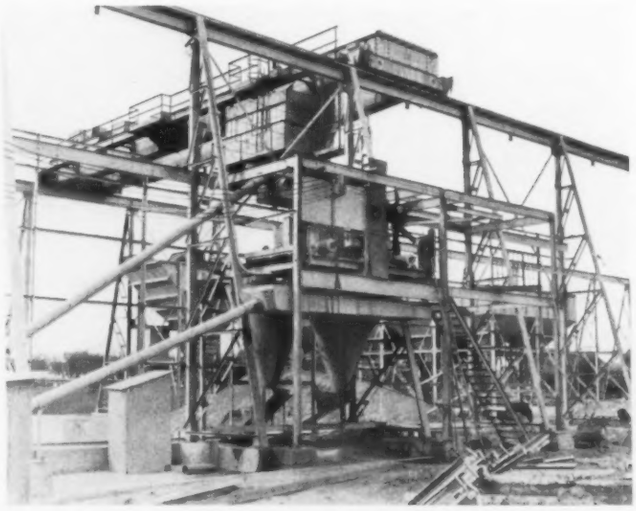
Gas-air shovel loading to trucks in pit of Twin City Sand & Gravel Co. for haulage to plant.

Drag-scraper which rehandles materials to and from storage piles at Twin City gravel plant.

Plant of the Twin City Sand & Gravel Co. at Hopkins, Minn. Stockpiling and screening tower is at left; crushing and scalping is done at right; loading building is in background.

and classifying the sand. The boats will be loaded at the rate of 3,000 tons per hr.

The Standard Gravel Co., Camden, Ark., put its Ouachita River plant in service in 1930. Its capacity was 150 tons per hr. On March 20 of that year an extremely efficient operation went into production at La Grange, Mo., owned by the Missouri Gravel Co. Material was obtained from a 348-acre deposit by dredge. The Montgomery Gravel Co. of Montgomery, Ala., also erected a new plant in 1930, equipping it with vibrating screens. A distributing plant on the river-front at St. Louis, Mo., as well as a dredging plant on the river itself were put in service during the year by the American Sand & Material Co.



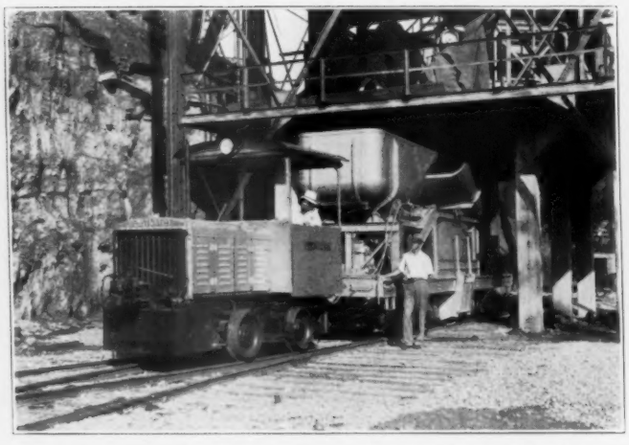
Screening and sand settling equipment of Dolomite Products Co. at Buffalo, N. Y. Note crane for storing and reclaiming.

Four important plants went into production in Texas in 1930. They were those of the Gifford-Hill Co., at Texarkana; the Landa Sand & Gravel Co., at Austin; and the Texas Sand & Gravel Co., which inaugurated operations at two plants near Waco.

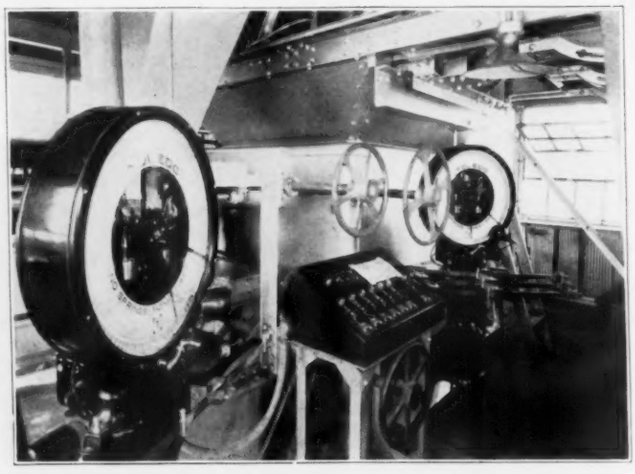
Some other new sand-and-gravel plants which went into operation in 1930 were those of the following: the Dolomite Products Co., Rochester, N. Y.; the Liberty Corp., Philadelphia, Pa.; the Hillside Sand & Gravel Co., Prospect, Wis.; the Automatic Gravel Products Co., Muscatine, Ia.; the Batavia Washed Sand & Gravel Co., Batavia, N. Y.; the Consumers Sand Co., New Castle, Pa.; the Albany Gravel Co., Croton-on-Hudson, N. Y.; the Pioneer Sand & Gravel Co., Tacoma, Wash.; the Clarence Sand & Gravel Co., Alexander, N. Y.; the Nugent Sand Co., Muskegon, Mich.; the Renshaw Sand, Rock & Gravel Co., Alturas, Cal.; the Phoenix Sand & Gravel Co., Warsaw, Mo.; the Modern Coal & Material Co., Pacific, Mo.; the East Meadow Sand-Gravel Co., East Hempstead, L. I.; the Keener Sand & Clay Co., Shinrock, O.; the Michigan Concrete & Material Co., Centerville, Mich.; the East Tennessee Sand & Gravel Co., Elizabethton, Tenn.; and the Watauga Stone Co., Siam, Tenn.

Plant of the Makins Sand & Gravel Co. near Sulphur, Okla. Loading conveyor and spout are in foreground.

Pre-mixed concrete plant of the Ready-Mix Concrete Co., San Francisco, Cal., with some of the agitator trucks in foreground.

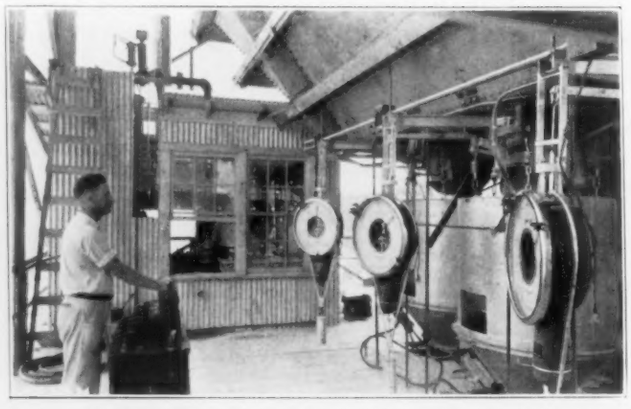


One of the gasoline-electric locomotives with special skip car under the concrete-mixing plant at Norris Dam.



The apparatus which automatically controls the weighing of all concrete ingredients in the concrete plant of the Lake Erie Mining Co., Peoria, Ill.

Central-mixing concrete plant of the Hilltop Builders' Supply Co., Cincinnati, O., with car at aggregate hopper.



View on batching floor of the Norris Dam concrete-mixing plant, showing one of control stations and some of batchers and scales.

Three of the four floating concrete mixing plants being used in the construction of the T V A Joe Wheeler Dam near Florence, Ala. Barges of aggregates shown being brought to the job.

Ready-Mixed Concrete Makes Big Gains Since Early Days of Industry

THE ready-mixed-concrete industry, in which production probably reached a lower percentage of capacity than in any of the other important industries in this field, showed a distinct improvement in 1934. Due to the present slum-eradication and home-modernization movements which are rapidly gaining momentum the outlook for 1935 is favorable, although little improvement in privately-financed construction is expected. Any considerable improvement in business conditions should result in a resumption of the rapid expansion of this industry which continued well into 1932. While most of the larger cities now have adequate production facilities, there are hundreds of cities of less than 100,000 population where plants will be needed. The present trend is toward central-batching plants, both permanent and portable, to supply concrete for outlying road and building construction.

Ready-Mixed Concrete

The Tennessee Valley Authority in 1934 contributed some of the most interesting developments in the history of the ready-mixed-concrete industry. The plant at Norris Dam, which went into operation in June, 1934, is a model large-capacity stationary plant. The floating mixing plants at Wheeler Dam are interesting but not particularly applicable to commercial production.

The Norris Dam plant receives stone and sand by belt-conveyor from the model crushing-and-screening plant which is described elsewhere in this issue in the crushed-stone review. Bins feed eight Johnson weigh-batchers which are controlled from two stations. Three Smith 86S tilting mixers are arranged to discharge concentrically through a single plant. Cement is received by railway at a point 5 mi. from the plant and is unloaded by Fuller-Kinyon portable pumps into a 6,000-bbl. steel tank. International trucks with 65-bbl. aluminum tank bodies haul the cement to the plant, where two Fuller-Kinyon Type H 6-in. pumps place it in storage.

The Wheeler Dam facilities consist of four portable mixing plants which are anchored alongside the cofferdams where the concrete is to be poured. The contract cost of these plants was $290,000. They went into operation late in 1934. At each plant sand and gravel are received in barges and are unloaded by an American Hoist & Derrick Co. revolving crane mounted on the mixer barge and placed in bins. Cement in bulk is received in barges and is unloaded and put in storage by a Fuller-Kinyon Type B 5-in. pump. Other equipment includes Blaw-Knox bins, batchers and water-measuring tanks, and a Norris K. Davis 2-cu.yd. concrete mixer.

The Superior Ready Mixed Concrete Co. in August, 1934, completed a new cement-batching system for its ready-mixed-concrete operations at Cincinnati, O. Cement is received in bulk and is discharged direct to a Robinson air-activated conveying system. This consists of a pressure tank in which the cement is aërated and then fed through a pipe-line by compressed air. In this installation this line is split to discharge to either of two Heltzel batching plants.

The Hilltop Builders' Supply Co., Cincinnati, O.,

New central-batching plant of the Dallas Concrete Co. at Dallas, Tex. Aggregate hopper is in background.

in April, 1934, put into operation a new central-mixing concrete plant. Cement and aggregates are received by railway and placed in storage by Robins bucket-elevators. The storage consists of a 32-ft. by 75-ft. concrete silo built by the Macdonald Engineering Co. The batching-and-mixing plant designed by Neff & Fry is located in the silo below the bins. Neff & Fry weighing batchers, a Blaw-Knox water-weighing tank and a 1½-cu.yd. Ransome mixer are used.

The Colonial Concrete Co., Inc., early in 1934 completed a simple and economical batching plant on the property of the Orange Quarry Co. at West Orange, N. J. Aggregates are discharged by trucks directly into bins and cement is handled in sacks. Blaw-Knox steel bins and weighing batchers are used. Concrete is delivered by seven Mack trucks equipped with 3½-cu.yd. Jaeger mixer bodies.

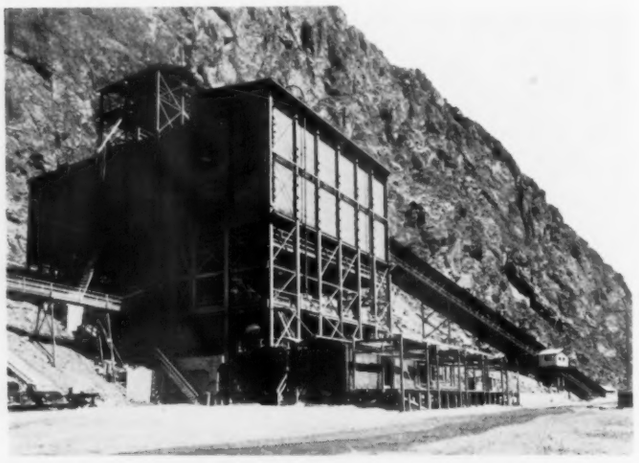
The Birmingham Slag Co. early in 1934 completed improvements costing $10,000 to its central-mixing plant at Ensley, Ala. The former wooden structure was replaced by one of steel.

The Mixed Concrete Co., Columbus, O., in 1934 purchased two additional Jaeger 2½-cu.yd. truck mixers and the General Material Co., St. Louis, Mo., placed a number of Jaeger truck mixers in service.

The combination central-mixing and dry-batching plant of the Fort Worth Sand & Gravel Co., Fort Worth, Tex.

The Dallas Concrete Co., Dallas, Tex., operates a concrete-batching plant which was completed early in 1933. An interesting feature of this plant is the discharge of aggregates from trucks into a field hopper having six radial compartments each of 100-ton capacity. A Barber-Greene feeder and belt-conveyor put the desired sizes in plant storage. Cement is received in bulk and is elevated to the bins. Johnson Acto-Bins and weigh-batchers are used and concrete is mixed and delivered in Jaeger truck mixers. In this same year this company also completed at Longview, Tex., another plant which supplies concrete for oil-well derrick foundations.

Other plants built in 1933 include those of J. K. Davison & Bros., Pittsburgh, Pa., the Concrete Service, Traverse City, Mich., and the Whittemore Sand & Gravel Co., Cambridge, Mass.



The central-mixing plant erected by Six Companies, Inc., to supply concrete for Boulder Dam.

The Consolidated Rock Products Co., Los Angeles, Cal., in 1932 entered the ready-mixed-concrete industry with five permanent central proportioning plants and two portable units of 60 and 45-cu.yd. per hr. capacities.

Six Companies, Inc., general contractors for the construction of Boulder Dam, in 1932 completed the installation of a central-mixing plant to supply the 4,400,000 cu.yd. of concrete needed for the dam and its appurtenances. While not a commercial operation, this 250-cu.yd. per hr. plant has many new features applicable to commercial plants.

Other new plants erected in 1932 include the following: Lake Erie Mining Co., Peoria, Ill. (100 cu.yd. per hr.); Willey-Ruckstuhl Co., Miamitown, O.; Ready-Mixed Concrete Corp., Dayton, O.; and Arundel-Brooks Concrete Corp., Baltimore, Md. (100 cu.yd. per hr.).

The Readymix Concrete Co., Ltd., San Francisco, Cal., in 1931 erected a plant of unusual design with a capacity of 100 cu.yd. per hr. Adjoining and supplying it is an aggregate storage and handling plant which is owned by the Kaiser Paving Co. and has a capacity of 2,000 tons. The mixing plant stores 240 tons. Cement is unloaded in bulk from railway cars by a Fuller-Kinyon portable pump. A single 20,000-lb. Bodinson weigh-batcher handles the

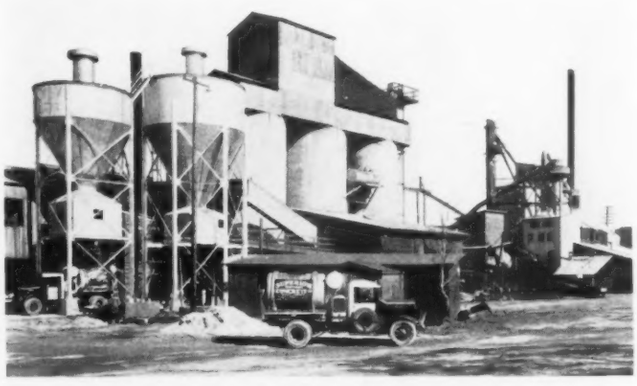
aggregates and a 2,200-lb. batcher the cement. A Ransome water-measuring tank, a Davis 84S mixer and twelve Jaeger, Rex and Davis agitator trucks are used.

Other new plants built in 1931 include:

Ready Mixed Concrete Co., Lincoln, Neb., 60 cu. yd. per hr.; Certified Concrete Co., Wauwatosa, Wis., 60 cu.yd. per hr.; Ready Mixed Concrete Corp., Indianapolis, Ind., 75 cu.yd. per hr.; Fort Worth Sand & Gravel Co., Fort Worth, Tex., 100 cu.yd. per hr.; Cranford Material Corp., Brooklyn, N. Y.; Warner Co., Morrisville, Pa., 100 cu.yd. per hr.; Bode Gravel Co., San Francisco, Cal., 125 cu.yd. per hr.; Ready Mixed Concrete Co., Inc., Ames, Ia., 15 cu.yd. per hr.; Ready Mixed Concrete Co., Lancaster, Pa., cost $75,000; Hankel Construction Co., Mason City, Ia., 40 cu.yd. per hr.; American Builders Supply Co., Louisville, Ky., cost $75,000 exclusive of delivery equipment; Waterbury Ready Mixed Concrete Co., Waterbury, Conn.; Pioneer Sand & Gravel Co., Seattle, Wash., cost $20,000; General Material Co., E. St. Louis, Mo.; Cincinnati Builders' Supply Co., Cincinnati, O., 40 cu.yd. per hr.; Knoxville Sangravl Material Co., Knoxville, Tenn.; Cherokee Sand & Gravel Co., Knoxville, Tenn., cost $45,000; Ready Mix & Supply Co., Albany, N. Y.

The Pioneer Sand & Gravel Co., Seattle, Wash., in 1931 expended a reported $250,000 in improving and extending its ready-mixed operations.

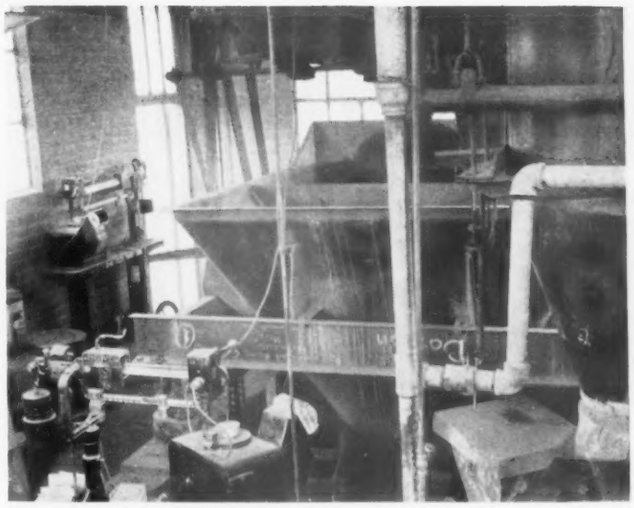
Improvements to existing facilities were made



The two new cement-batching units of the Superior Ready Mixed Concrete Co., Cincinnati, O.

by the Queen City Crushed Stone & Sand Co., at Miamiville, O.; the Sloss-Sheffield Steel & Iron Co., at Birmingham, Ala.; and Geo. M. Brewster & Son, Inc., Bogota, N. J.

New plants erected in 1930 included the following: Liberty Corp., Philadelphia, Pa.; Bridgeport Concrete Co., Bridgeport, Conn., 50 cu.yd. per hr.; Mark R. Hanna Co., Detroit, Mich., 80 cu.yd. per hr.; Standard Sand & Gravel Co., Wheeling, W. Va., 40 cu.yd. per hr.; P. W. Lambert & Co., Inc., Linden, N. J.; Transit-Mix Concrete Corp., Brooklyn, Astoria, and Flushing, L. I., N. Y.; Samuel Braen's Sons, Hawthorne, N. J.; Ready-Mixed Concrete Co., Omaha, Neb.; J. L. Shiely Co., St. Paul, Minn.; Tucker Concrete Products Co., Ft. Worth, Tex., 25 cu.yd. per hr.; Keefner Concrete Co., Des Moines,



Aggregate and cement weighing batchers and scales in the plant of Boston Transit Mixers, Inc., Boston, Mass.

Ia., 90 cu.yd. per day; C. W. Blakeslee & Sons, Inc., New Haven, Conn.; Cayll & Barrett, Inc., Waukesha, Wis.; Nashville Ready-Mixed Concrete & Supply Co., Nashville, Tenn., 40 cu.yd. per hr.; Boston Transit Mixers, Inc., Boston, Mass.; Turner Gravel Co., San Antonio, Tex.; Worcester Transit Concrete, Inc., Worcester, Mass.; J. J. Clarke Co., Ltd., New Orleans, La., 45 cu.yd. per hr.; Central Concrete Mixing Corp., Brooklyn, N. Y., 100 cu.yd. per hr.

Important improvements made by established producers in 1930 include the following: The Warner Co., Philadelphia, Pa., carried out a $100,000 program of expansion; The Boston Concrete Corp., Cambridge, Mass., cost $70,000.

Aggregate Bituminizing

ONE of the marked results of the depression was the entrance of aggregate producers on an increasing scale into the production of bituminized aggregates. This was the result of a realization

Aggregate-bituminizing plant of Colprovia Road Products, Inc. Columbia, S. C.

by producers that they are ideally suited to such production by reason of location, proximity to aggregate supplies, and the possibility of utilizing sizes of aggregates formerly wasted. The growing demand for bituminized aggregates created by expansion of secondary-highway construction programs is also a factor.

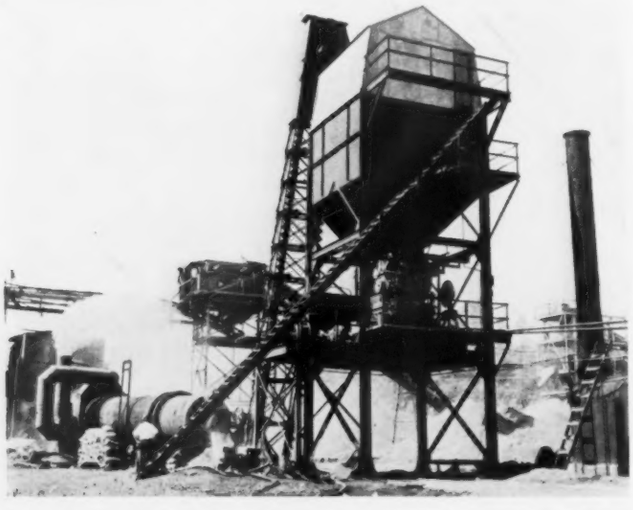
The Kingston Bituminous Products Co., Kingston, N. J., in June, 1934, completed a new 50-ton per hr. aggregate-bituminizing plant alongside the crushed-stone plant of its affiliate, the Kingston Trap Rock Co. The equipment consists of a Robins vibrating screen, a Ruggles-Cole rotary drier, and Cummer pug-mill, elevators, bins, batchers and conveyors.

The Muskingum Valley Asphalt & Supply Co., a subsidiary of the Marietta Concrete Corp., sand-and-gravel producer of Marietta, O., in June, 1934, completed a new commercial aggregate-bituminizing plant at Zanesville, O. This was furnished complete by Hetherington & Berner, Inc., and has a capacity of 40 tons per hr. of hot- or cold-mixed material. A Blaw-Knox steel bin and a Deister Plat-O vibrating screen are used.

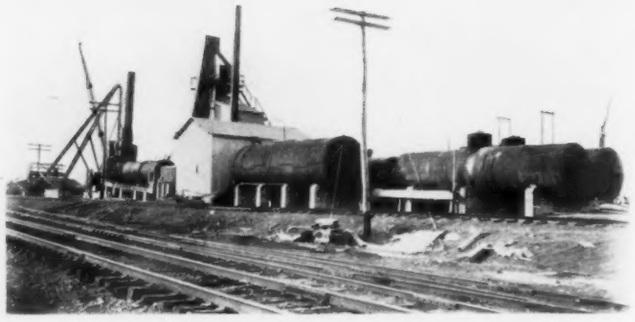
Colprovia Road Products, Inc., owned by several aggregate producers, early in 1934 completed a 30-ton per hr. commercial aggregate-bituminizing plant on the property of the Palmetto Quarries Co. at Columbia, S. C. The equipment includes a J. B. Wise pulverizer and Link-Belt conveyors and elevators.

The Tractor City Sand & Gravel Co., Janesville, Wis., in 1934 erected a new aggregate-bituminizing plant using the American Sealdrock process. The Chambersburg Stone Co., Chambersburg, Pa., completed the erection of a bituminizing plant using the Barber process. The Big Rock Stone & Material Co., Little Rock, Ark., in October, 1934, put into operation a bituminizing plant.

The General Crushed Stone Co., Easton, Pa., one of the country's largest producers of crushed stone, is also one of the most important commercial producers of bituminized aggregates, operating ten plants in the states of New York, Pennsylvania and Massachusetts. The latest development by this company was the installation in 1934 of equipment for bituminizing aggregates at its crushed-stone plant at Oaks Corners, N. Y.



The new aggregate-bituminizing plant of the Kingston Bituminous Products Co. near Kingston, N. J.



The aggregate-bituminizing plant of the General Crushed Stone Co. at Watertown, N. Y.

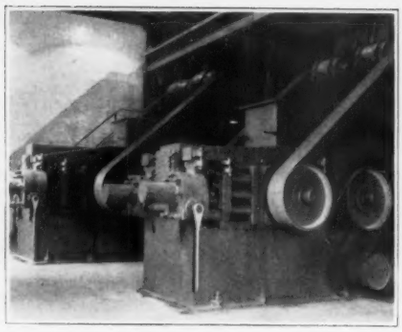
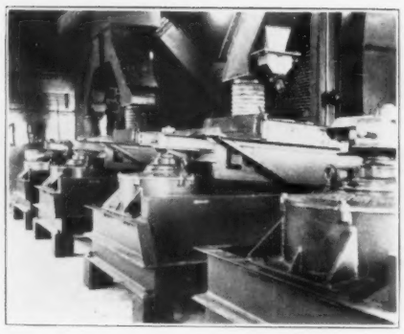
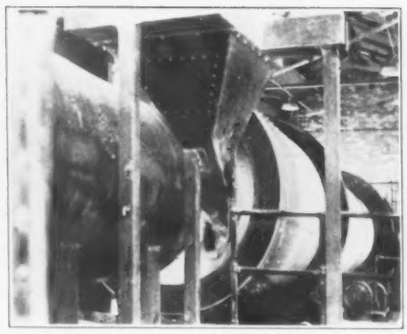
In 1933 this company erected new 50-ton per hr. Cummer bituminizing plants at Watertown and Horseheads, N. Y., the latter at a reported cost of $40,000. Both plants have 2-ton mixers and complete screening, storage, handling and weighing equipment and are of fireproof steel-and-concrete construction. The Horseheads plant is supplied by railway with dried crushed stone while the Watertown plant is alongside the crushed-stone plant there and is equipped with a rotary drier. The company's plant at Akron, N. Y., was completely rebuilt during the year and drying equipment was installed in some of the other plants. The plant at Woburn, Mass., was built in 1930.

One of the most interesting of the new aggregate-bituminizing plants put into operation during this period is that of the Ottawa Asphalt Co. at Ottawa, Ill., which was completed in April, 1933. This company is a subsidiary of the Ottawa Silica Co., one of the largest producers of silica sand, and uses this material in its product. The plant has a capacity of about 50 tons per hr. and was built and equipped by the Stephens-Adamson Mfg. Co. The Colprovia process is used and cold-mixed base and surfacing materials are produced.

The West Process Paving Co. in 1933 installed a new aggregate-bituminizing plant near the crushed-stone plant of the France Stone Co. at Bloomville, O. This is a continuous plant of special design and has a capacity of 40 tons per hr. of Westphalt, a hot-mixed, hot-laid material. The equipment includes a Jeffrey portable belt-loader and a 35-hp. Waukesha gasoline engine.

T. L. Herbert & Sons, Nashville, Tenn., sand-and-gravel producers, in May, 1931, completed a modern commercial asphalt plant of 25-ton per hr. capacity which uses the Pre Cote process.

The Bituminous Products Co., in 1931, erected a commercial aggregate-bituminizing plant at Cheektowaga, N. Y., alongside the crushed-stone plant of its affiliate, the Federal Crushed Stone Corp. This plant was designed and equipped by the J. D. Farasey Co.

Interior views at the plant of the Minnesota Mining & Mfg. Co., Wausau, Wis. Two of the three double-roll crushers at left; four vibrating sizing screens in center; rotary drier at right.

Slag, Silica and Other Plants Install Equipment to Meet Modern Demand

THE nonmetallic-mineral industries not included in the reviews appearing elsewhere in this issue also participated in the general business improvement which began in 1933. Many of these industries, such as silica and industrial sands, feldspar, mica, kaolin, sulphur, alkali, etc., depend largely upon various chemical and manufacturing industries for disposal of their products. Because of this condition most of these industries experienced a decided increase in demand long before other industries dependent on construction work were similarly affected. As a result some of the most important plant developments ever made in these industries took place in the last few years.

The industries dependent on highway and building construction also showed signs of renewed activity. Producers of rock asphalt, slag and gypsum in 1933 and 1934 erected many new plants and carried out important expansion and improvement programs. Prices in most of these industries recently showed sharp improvement, although in many of them prices were never below the profit-making level. The small number of producers in most of these industries, many of which are almost monopolized by a few companies, prevented an overexpansion of production facilities during "boom" times with its resulting price demoralization during the depression.

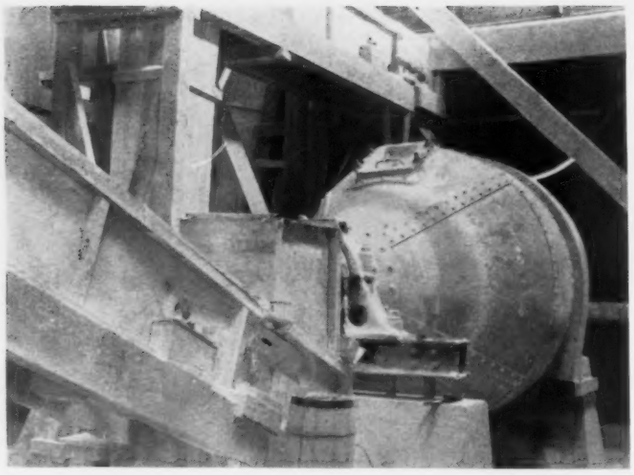
The Minnesota Mining & Mfg. Co. in September, 1934, put in operation a new fine-crushing and screening plant and an additional color-quartz plant at Wausau, Wis., for the production of roofing granules. These were installed at a reported cost of $300,000 and followed the installation earlier in the year of primary crushing equipment and the erection of the original color-quartz plant in 1932.

The raw quartzite is obtained from a deposit 5½ mi. by road from the plant. A Marion 460 Diesel-electric shovel and a P&H 1¼-cu.yd. gasoline shovel load motor vehicles for haulage to the plant. Nine of these are Diamond T 10-ton tractor-trucks, one is a Sterling 13-ton tractor and four are Sterling 8-ton trucks. All truck-loads are weighed at the plant before being discharged into the 36-in. by 48-in. Traylor primary jaw crusher. A Traylor 4-ft. TZ gyratory used for secondary crushing discharges by elevator to the 7-ft. by 45-ft. Bartlett & Snow rotary drier.

Dried material is elevated to two 20-ft. by 55-ft. concrete silos from which it is reclaimed by a series of belt-conveyors, a Merrick Weightometer recording the amount of material entering the new crushing and screening plant. An elevator feeds an Orville Simpson Rotex screen which discharges oversize to a 54-in. by 14-in. Traylor 3M Wausau double-roll crusher and back over the first screen. The fines from this screen go to an elevator feeding two Rotex screens which scalp the oversize to two 42-in. by 16-in. Traylor Wausau crushers. The fines from these screens drop to three Rotex finishing screens. Belt-conveyors and elevators feed the two 20-ft. by 55-ft. finished-granule storage-silos. Another Merrick Weightometer records the output of this plant. The new plant has a Research Corp. Cottrell electric-precipitator system which collects dust from each unit of equipment and each room in the plant. Another Cottrell unit is installed in the drier stack.

The Traylor Eng. & Mfg. Co. supplied all the crushing equipment for this plant, the Orville Simpson Co. all the screens, the C. O. Bartlett & Snow Co. all the bucket-elevators, the Chain Belt Co. all the belt-conveyors, the U. S. Rubber Co. all the conveyor belting and the General Electric Co. supplied all the motors and other electrical equipment. Both the color-quartz plants are supplied by the new plant. T. L. Smith mixers and Bartlett & Snow kilns and coolers are the major items of equipment in these plants.

The Central Silica Corp. early in 1934 put in operation a new plant at Collinwood, Tenn., for the processing of tripoli. The equipment includes a Sturtevant jaw crusher, a rotary drier, a Hardinge conical mill, and a Gayco separator. The plant is

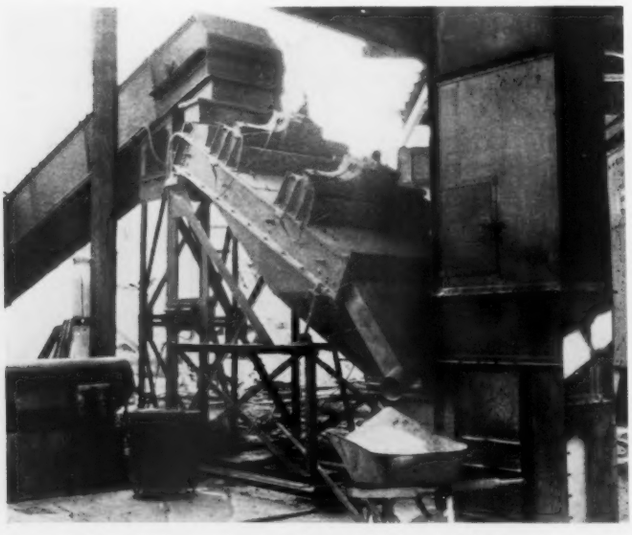


Conical grinding mill and conveyor in plant of the Central Silica Corp. at Collinwood, Tenn.

operated by a 200-hp. De La Vergne oil engine.

A new silica-sand plant, with a capacity of 150 tons per hr., was completed in 1934 at Utica, Ill., by the George M. Prendergast Co., of Milwaukee, Wis. At Ada, Okla., Harry Barndollar and H. H. Hanenkratt began production at their new rock-asphalt plant. A new barium plant, costing $20,000, went into operation early in 1934 near Barstow, being owned and operated by the Pacific Minerals Co. The Haymon-Krupp Products Corp., El Paso, Tex., began refining diatomaceous rock at a new mill there during the past year. Considerable new equipment was installed last summer at the fluorspar mines of the Salida Fluorspar Co., near Leadville, Colo.

Construction was completed late in 1934 by the United States Potash Co. of its newest refinery near Artesia, N. M. Two 12-ft. Sturtevant air-separators were installed in 1933 and 1934 at the plant of the New Jersey Pulverizing Co. at Pinewald, N. J. Another separator of similar design was only recently added to the equipment of the Spotswood, N. J., plant of Titanium Pigment Co., Inc. A $45,000 plant for the processing of asphaltic rock was

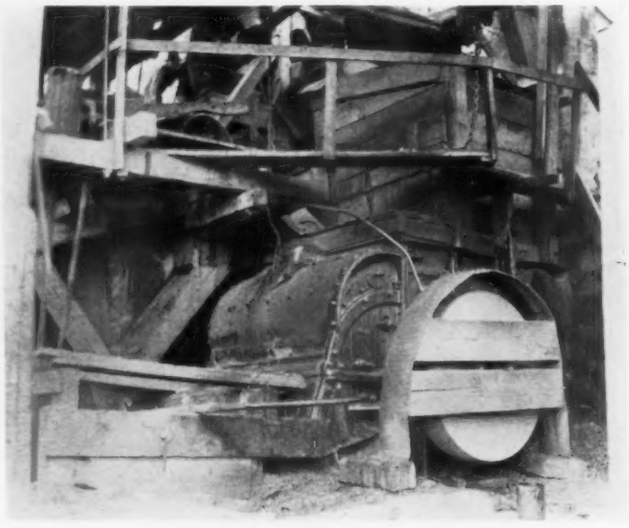


New inclosed conveyor, elevator and electric vibrating screen in the plant of the Pittsburgh Plate Glass Co. at Crystal City, Mo.

under construction late in 1934 near Hillsboro, O., by Myers & Dietrich.

In order to accomplish finer grinding of its product, the Feldspar Milling Co. installed a Sturtevant air-separator at its plant at Bowditch, N. C., in 1934. In June of last year, two 15-ton Caterpillar Diesel tractors went into service at the phosphate workings of the International Agricultural Corp. at Mulberry, Fla. Outstanding new alkali plants were erected by the Southern Alkali Co. at Corpus Christi, Tex., and by the Mathieson Alkali Co. at Lake Charles, La. These are discussed in the lime review.

The Pittsburgh Plate Glass Co. in 1934 made extensive improvements to the drying and storage departments of its silica plant at Crystal City, Mo. A Chain Belt conveyor feeds raw silica to a new Ruggles-Coles rotary drier. Another conveyor feeds a



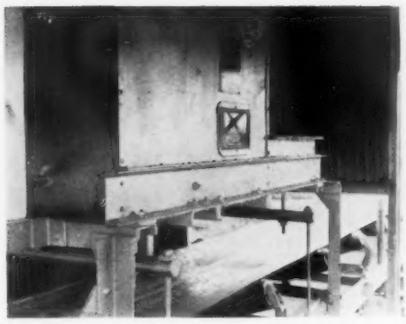
New primary-crushing hammer-mill in the plant of the Southern Rock Asphalt Co. at Dougherty, Okla.

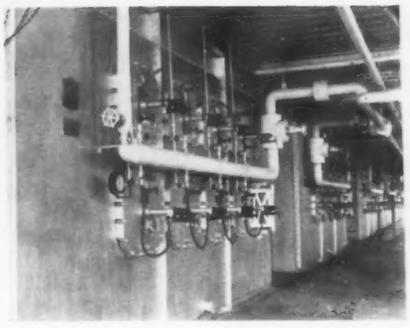
Tyler Hum-mer vibrating screen, and a Chain Belt elevator feeds two 500-ton steel storage-tanks.

The Southern Rock Asphalt Co. in 1934 made extensive improvements to its plant at Dougherty, Okla. A new Williams W2 Jumbo hammer-mill was installed for primary crushing, and a 125-hp. and a 150-hp. Atlas Imperial Diesel engine have been installed to operate this plant.

The sulphur produced in this country comes from a few large plants and for this reason the addition of a new plant is a rare and important occurrence. The new operation of the Freeport Sulphur Co. at Grande Ecaille, La., which went into operation Dec. 8, 1933, stands out in this industry and is also one of the most important of the many major developments made in the nonmetallic-mineral industries in recent years.

The sulphur is secured from a typical Gulf Coast salt dome by the usual hot-water well method. The wells and the main plant are located at Grande Ecaille, 45 mi. south of New Orleans, La., on marsh land bordering Lake Washington. All the buildings are supported on piling and walkways connect them and other parts of the operations. The liquefied sulphur is pumped from the wells into



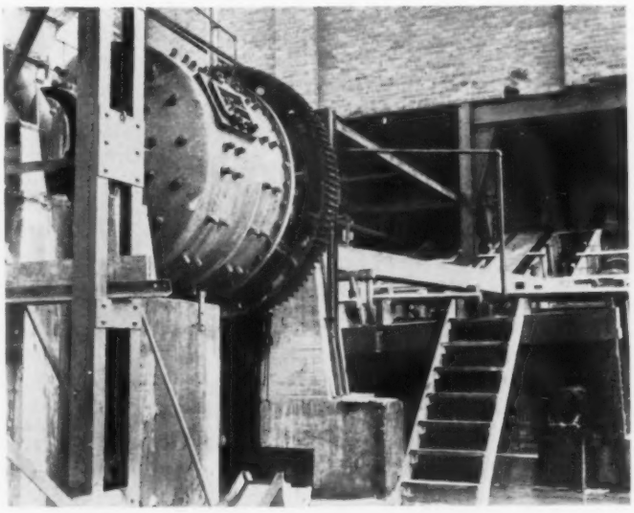


Three views of operations of Freeport Sulphur Co. At left is crane unloading sulphur from barges for boat loading. Center is automatic weighing device for barge-loading belt-conveyor. At right are some of six 860-hp. oil-fired boilers.

the usual type of wooden-walled vats where it is allowed to solidify.

The most interesting part of this plant is the water-supply and preparation system which is said to be the most modern and efficient yet developed. Water is pumped from Mississippi River into a settling tank and thence 10 mi. to the plant. It is then softened and preheated before going to Babcock & Wilcox high-pressure steam heaters which bring it to the desired temperature of 350 deg. F. for use in the wells. Six Babcock & Wilcox 860-hp. oil-fired boilers supply the steam for all the operations and for generating electric current. The bleed water from the wells is pumped to a treating plant which removes all the harmful ingredients before the water is released into Lake Washington. Complete machine- and repair-shop facilities are also located here.

The solidified sulphur is drilled and blasted and is then loaded by electric shovels on movable field belt-conveyors. These carry it to a main belt-conveyor operating on 950-ft. centers and feeding a shuttle conveyor which discharges into barges. A Merrick Weightometer weighs the material as it passes over the main belt. The barges are towed 10 mi. through a canal to Port Sulphur on Mississippi River, where a P & H 10-ton gantry crane unloads the sulphur to open storage or direct on a belt-conveyor system for loading into cars, river barges or seagoing boats. The material is again weighed on these conveyors.



The conical scrubber in the plant of the Michigan Silica Co., Rockwood, Mich. Screw washers are in background.

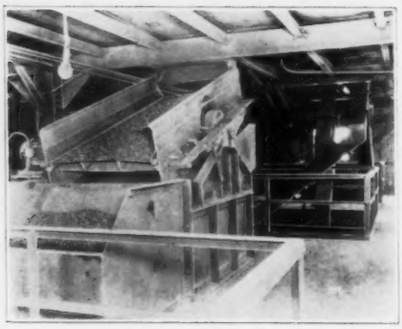
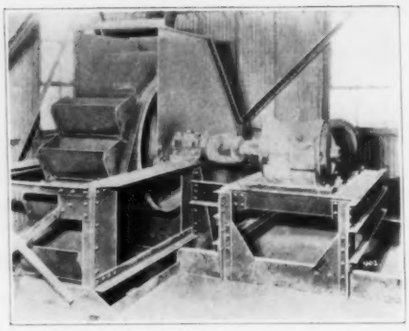
Slag, obtained from steel-mill dumps on Zug Island, near Detroit, Mich., is crushed and sold as aggregates by the plant of the Great Lakes Steel Corp., which began operations in November, 1933. Its capacity is 100 tons per hr. The plant is well located to serve the Detroit metropolitan market and features flexibility in the sizing of the finished material without sacrificing simplicity of design. The equipment includes a 1½-cu.yd. Bucyrus-Erie shovel, Jeffrey feeders, apron- and belt-conveyors and bucket-elevators, four Robins Gyrex screens, a 16-in. Traylor gyratory primary crusher, and a Symons 4-ft. cone crusher.

Symons short-head cone crushers were installed in 1933 in the Erwin, Tenn., and Kingman, Ariz., plants of the Consolidated Feldspar Corp. The same year witnessed numerous plant developments by the U. S. Gypsum Co., including the erection of a wall-board plant near its gypsum workings at Midland, Cal., and a partition-tile plant at New Brighton, N. Y. These were announced as part of a $400,000 improvement program.

Early in 1933 production began at the new quarry and plant of the Santa Rosa Rock Asphalt Co., Santa Rosa, N. M. Electric power for operation is supplied by a special plant employing Diesel-driven generators. Another western rock-asphalt plant began operating about the same time at Sunnyside, Utah, by a new concern known as the Rock Asphalt Co. of Utah.

Utilizing quarry waste obtained in the immediate vicinity, a mineral-wool plant owned by the Seneca Rock Wool Co. began operating at Tiffin, O., in the summer of 1933. A 1933 development in the silica industry was the erection of a sand-grinding plant at Meade, Kan., by Mid-Co. Products Co. In October of the same year the new mica-milling plant of the Muscovite Mining & Milling Co. went into production at Guernsey, Wyo. Volcanic-ash and fullers' earth are the principal products of the Texas Production Co., from its plant at Tahoka, Tex., which was completed late in 1933.

The Michigan Silica Co., Rockwood, Mich., in 1933 improved its plant by the installation of a second Ruggles-Coles rotary drier, a Hardinge conical scrubber, six Link-Belt screw-washers and incidental equipment.

Views in the slag plant of the Great Lakes Steel Corp. at Detroit, Mich. At left is one of vibrating screens; center is head of bucket-elevator; right is conveyor with magnetic head pulley.

An underground talc mine was opened by the Michigan Talc Mining Co., near Ishpeming, Mich., in the autumn of 1933. Raw material is shipped by rail to the firm's processing plant at Detroit.

Several important silica operations were improved in 1933. Among these were the Southern Products & Silica Co., with a new grinding-and-screening plant at Lilesville, N. C.; the Wedron Silica Co., Wedron, Ill., which continued its improvement program, with special emphasis on new devices to prevent silicosis among its workers. Jigger vibrating screens were installed in the Wedron plant in 1933 and a new screening and storage building was erected in 1931 and a second Sly dust-collecting unit was added in that year. The Mid-Continental Glass Sand Co., installed Universal vibrating screens to replace those of the revolving type.

The Silica Co. of California, Ltd., installed $25,000 worth of dry-screening equipment at its plant near Brentwood, Cal. The increased demand from bottle manufacturers following the legalization of beer and the approach of "repeal," were responsible for the improvements.

Two alkali producers—the Michigan Alkali Co., Wyandotte, Mich., and Diamond Alkali Co., Pittsburgh, Pa.—made improvements to their stone-crushing plants in 1933, both concerns installing Jigger vibrating screens to facilitate the sizing of material.

Construction was completed at Marion, N. C., late in 1933 on a new plant for the production of wet-ground mica by Marion Mica Mills. The plant of the Sand Drying Corp., at Ten Mile, S. C., was rebuilt following destruction by fire.

Among other interesting 1933 developments in the field of miscellaneous nonmetallic-minerals were the following: Funkhouser Co. installed a 14-ft. Raymond air-separator at its Delta, Pa., slate-crushing plant; a similar Raymond separator was put in operation at the Dry Branch, Ga., kaolin plant of Superior Kaolin Co.; J. M. Huber Pigment Co., Langley, S. C., added a Marion electric shovel and a Plymouth 25-ton gasoline locomotive to its quarrying equipment; four Niagara gyrating-tube scrubbers were added at the Durand, Fla., phosphate-washing plant of American Agricultural Chemical Co.; and improved facilities for grinding and processing were installed in the custom-grinding plant of F. E. Schundler & Co., at Joliet, Ill. The equipment installed included a Raymond high-side roller-mill equipped with a Whizzer separator, a Raymond 10-ft. mechanical separator, a Universal jaw crusher, conveyors, elevators, etc.

The Silica Products Co. late in 1932 completed the construction of a new bentonite plant at Clay Spur, Wyo., to replace the one which was completely destroyed by fire in December, 1931. This is now a modern plant of fireproof concrete-and-steel construction. The field equipment consists of two Caterpillar tractors and a Whitcomb locomotive. The plant equipment includes a Link-Belt double-roll primary crusher and vibrating screen, a Gruendler secondary crusher, a Babcock & Wilcox rotary drier, a Raymond 4-roller mill and a St. Regis packer. Two Fairbanks-Morse 400-hp. Fairbanks-Morse Diesel-engine generating sets supply the power for all operations.

The year 1932 witnessed the opening of two extensive potash deposits in the southwest. The Texas Potash Co., Dallas, announced plans for the erection of a $2,500,000 processing plant near its potash mines at Odessa, Tex., while the New Mexico Potash & Chemical Co. enlarged its operations with the beginning of mining on a recently-acquired 50,000-acre tract in Eddy County, N. M.

In the field of silica-sand production in 1932, the Tavern Rock Sand Co. acquired 275 acres of deposits near Enterprise, Ky., and built a large new plant. At the company's Klondike, Mo., operations a complete dust-collecting system and air-separators were installed by the Northern Blower Co. Standard Silica Co. of Ottawa, Ill., awarded a $100,000 contract for erecting a new drying plant. Another new plant was erected in the Ottawa district by the Aetna Sand & Gravel Co. of Chicago, which had purchased valuable deposits in 1932. The new plant went into production late in the summer of 1933.

The new rock-asphalt plant of the Kansas Rock Asphalt Co. at Pleasanton, Kan., began operating in May, 1932. Natural gas was used to fuel a 90-hp. engine supplying power for the plant. Natural bitumen obtained from a well near the property was added to the finished material. In this improved form the product was in great demand for local road-building and the plant operated at capacity from the start.

Earth Products Co., Inc., at Houston, Tex., began preliminary work in 1932 on the construction of its plant on the ship channel at Houston. One sec-

tion of the plant was designed for the preparation of the rarer nonmetallic minerals; the other was devoted to custom grinding.

An average of 1½ car-loads of finished insulating material was being produced daily as the new rock-wool plant of Tennessee Products Corp. began operating at Rockdale, Tenn. Coke was employed to fuse the rock before spinning.

The Burnham Chemical Co. was completing its new salt-refining plant at Searles Lake, near Westend, Cal., late in 1932.

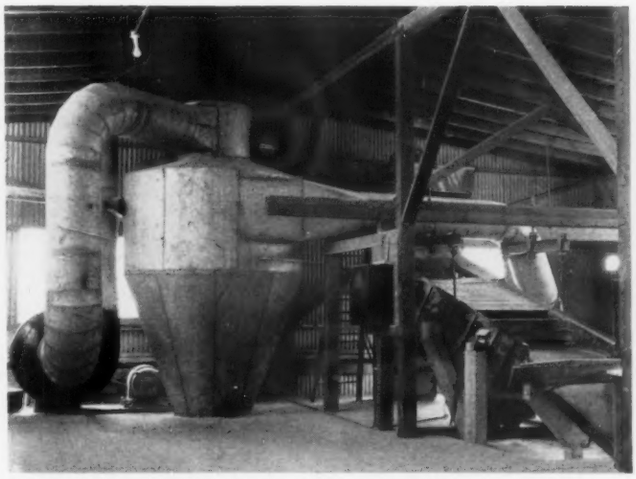
The demand for rock-asphalt forced the Texas Rock Asphalt Co. to begin producing material in June, 1931, before construction was completed. Finishing touches were made while in full operation later on in the year. The plant is located near Cline, Tex., in the Uvalde asphaltic-rock belt.

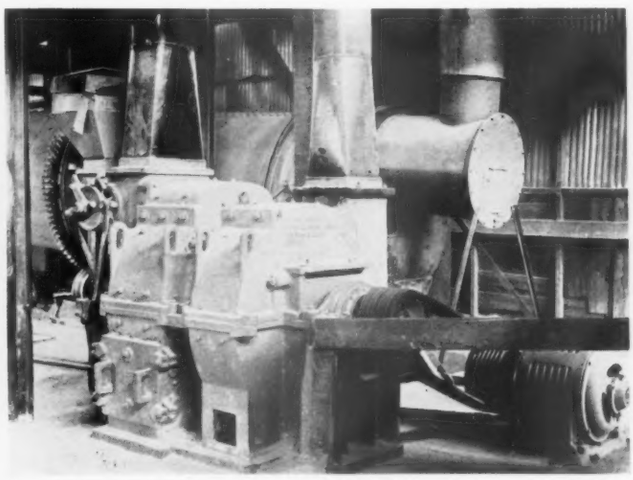
Considerable new-plant activity prevailed in the slag industry in 1931. The Buffalo Slag Co. built a new plant at Lackawanna, N. Y., and put it into production. As rebuilt, the operation had a capacity of about 45 tons of material per man-hr., the new lay-out having cut production costs to the minimum. The equipment includes Niagara and Robins vibrating screens. The Standard Slag Co., of Youngstown, O., began the construction of its new slag-crushing and screening plant at Holliday's Cove, O., in the early spring of 1931. Production began later in the same year. The plant equipment included Jeffrey feeders, apron- and belt-conveyors and bucket-elevators, Niagara screens and a Symons 4½-ft. cone crusher. The Roquemore Gravel Co. of Birmingham, Ala., entered the slag field with a crushing-and-screening plant having a daily capacity of 50 car-loads. The plant was located near its source of material, a slag dump of the Pullman Co. The equipment included a Symons 5½-ft. cone crusher and a Niagara vibrating screen. In the late spring of 1931 the No. 1 plant of the Birmingham Slag Co. at Ensley, Ala., was again in operation after having been rebuilt following a disastrous fire. The new operation was entirely fireproof and represented a capital investment of $50,000.

Two new plants began operation just a few miles apart in the pebble-phosphate field in Florida in 1931. The International Agricultural Chemical Co. at Mulberry, Fla., announced an annual production capacity of 1,500,000 tons at its modern pulverizing-and-drying plant. The new plant of the Southern Phosphate Co., located midway between Bartow and Mulberry, Fla., was an excellent example of the latest development in drying and shipping phosphate. A feature of the plant was its efficient tunnel-recovery system of material in storage.

A refining plant for clay used in filtering and bleaching oils was erected and began operating in August, 1931, near Los Angeles, Cal., the owner being Olancha Mineral Products Co. The equipment included a Gruendler hammer-mill, three Traylor electric vibrating screens, a Raymond impact pulverizer and two Raymond dust-collectors. Another West Coast development of that year was the opening of the sulphur-processing plant of Sunland Sulphur Co., Fresno, Cal. Raw material was received by railway.

Other plant improvements of importance in 1931 included two new silica-sand plants. One at Harrison, Ark., built by the Silica Products Co., had an initial daily capacity of 3,000 tons and cost $75,000 to erect; the other was built at Gore, Va., by the Virginia Glass Sand Co. for the production of No. 1 glass sand. The National Potash Co. of Carlsbad, N. M., began operating in the new Eddy County potash area. The Clarence Center, N. Y., gypsum mine of the National Gypsum Co. was completely motorized by Westinghouse. An 8-ton trolley locomotive was used to transport loaded cars from the mine to the plant. A brine plant for producing salt by evaporation went into operation at Salina, Utah, owned by the Great Western Salt Co. Locally-mined coal was used to fire the evaporators. New hoisting and conveying equipment completely modernized the Annandale, N. J., plant of the Annandale Graphite Corp. and the Georgia Kaolin Co., Dry Branch, Ga., solved an old problem of transportation from pit to plant by installing an aërial tramway.



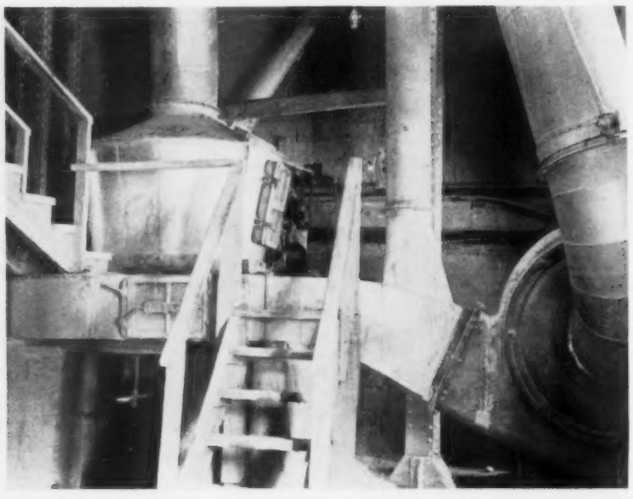


Two views in bleaching clay plant of Olancha Mineral Products Co., Los Angeles, Cal. At left is cyclone and electric vibrating screen. At right is impact pulverizer with rotary drier in background.

Some of the equipment in the plant of the Silica Products Co., Clay Spur, Wyo.

In 1930 two new slag plants began operating. One of the largest in existence, that of the Detroit Slag & Dock Co., started production at Detroit in October of that year. Its capacity was 250 tons per hr. Furnace-run slag was obtained from several steel mills in the Detroit area, being transported to the new plant on Detroit River by trucks and barges. The equipment included Stephens-Adamson feeders, belt-conveyors, bucket-elevators and revolving and vibrating screens and Allis-Chalmers crushers. The Cashion Slag Co., now the France Slag Co., opened its new slag-crushing plant at Baird Station, Pa., Aug. 15, 1930. Entirely electrically-operated, the plant had an annual capacity of 175,000 tons.

Notable improvements were made in 1930 at three



Five-roller high-side mill used by Arizona Gypsum Plaster Co., Douglas, Ariz.

widely-separated gypsum operations. About $90,000 was spent for new machinery in bringing the Long Beach, Cal., plant of the Standard Gypsum Co. up to date. New docks, piers and unloading facilities were erected at the New York, N. Y., plant of the Atlantic Gypsum Products Co. The Arizona Gypsum Plaster Co., Douglas, Ariz., installed a Raymond 5-roller high-side mill and opened a new quarry and crushing plant at Curtis, Ariz., at a reported cost of $30,000.

Equipment supplied by Allis-Chalmers Co. was used in doubling the capacity of the Midway, Fla., plant of the Fullers' Earth Co. Approximately $100,000 was invested in improving the mill, which began operating in December, 1930. The grinding of silica rock began in the new Burlington, Wash., plant of Northwest Mineral Products Co. late in the year. A large power-plant was erected at Valley Forge, Pa., to supply power to the plants of the Ehret Magnesia Mfg. Co. An early experiment in

Bag-packer in plant of Wedron Silica Co., Wedron, Ill. Respirator worn by operator is connected to pure air supply line.

the ready-mixed-mortar field was the plant erected in 1930 at Birmingham, Ala., to supply this material. It was sponsored by the Kirkpatrick Sand & Cement Co.

Equipment valued at $15,000 was installed in the asbestos-processing plant opened early in 1930 by the Asbestos-Talc Products Co. at Burlington, Wash. The W. H. Loomis Talc Corp. enlarged its mines at Gouverneur, N. Y., erected another mill and installed Hardinge grinding equipment throughout its plants. An addition to its quartz-grinding plant costing $100,000 was announced by the Philadelphia Quartz Co., Philadelphia, Pa. Crushers, conveyors and packing equipment were installed at the gypsum mine near Fresno, Calif., owned and operated by A. P. Shephard.

Vital problems regarding the industry will be discussed at the conventions of the sand-and-gravel, crushed-stone, slag and ready-mixed concrete associations at the Palmer House, Chicago, January 28-31. Will you be there?

MEN OF THE INDUSTRY

HARRY F. JENNINGS

HARRY F. JENNINGS, secretary of the Wabash Portland Cement Co., with plants at Stroh, Ind., and Osborn, O., has served the cement industry in many important capacities. As director of the Portland Cement Association and member of important association committees, he has exercised his keen knowledge and long experience in the interests of commercial progress. He was recently elected a trustee of The Cement Institute by unanimous vote. Mr. Jennings has been with the Wabash company twenty-seven years and makes his home in Detroit.

Personal Mention

W. R. Thomas, production manager of the Fort Worth Sand & Gravel Co., Fort Worth, Tex., has earned for himself the title of "Fort Worth's first and only air commuter." Mr. Thomas flies back and forth each day between Fort Worth and the company's sand-and-gravel operations about twelve miles east of the city, having built up more than 60 hours of flying time so far.

Robert B. Henderson, president of Pacific Portland Cement Co., San Francisco, Cal., was elected vice-president of the National Association of Manufacturers at its annual convention held in December at the Waldorf-Astoria hotel, New York, N. Y.

Joseph McIlvenny, Bessemer Limestone & Cement Co., was named a director of the Electrical Maintenance Engineers' Assn. at the annual gathering of the organization at Youngstown, O., recently.

L. L. Drake, traffic manager of the Lehigh Portland Cement Co., is the 1935 president of the Traffic Club of Kansas City, having been chosen for the honor at a recent gathering of the club. The organization is composed of railroad men and shippers in the Kansas City area. Mr. Drake was installed in his new office at the club's annual dinner, held January 10, 1935.

Walter Joseph, who has been in charge of operations of the Raabe Stone Co., at Kalida, O., for several years, recently resigned to become connected with the National Lime & Stone Co. at Lima, O.

Frank Brocksbank, chief timekeeper in the accounting department of the Universal Atlas Cement Co., at Hudson, N. Y., recently became a member of the Silver Medal Club of the Universal-Atlas organization, following his completion of 25 years of continuous service with the company. Presentation of the medal was made by **Richard A. Dittmar,** general manager of the Hudson plant, with appropriate ceremonies recently.

Robert F. McCloskey has been named director and vice-president of Blaw-Knox Co. in charge of operations of the plants located at Blawnox, Pa., to replace Wayne Rawley, deceased. Mr. McCloskey was previously general superintendent of the company's Blawnox shops. He has been associated with the company since 1920, starting as manager of a plant then located at Wheatland, Pa. In 1922 he was made production manager of shops at Blawnox, and in 1931 became general superintendent.

W. H. McDowell has been appointed sales manager of the Kansas City offices of the Universal Atlas Cement Co., succeeding C. S. McArdle, who recently resigned. Announcement of Mr. McDowell's appointment was made by F. L. Stone, vice-president and general sales manager of the Universal Atlas company. Mr. McDowell joined the Universal Atlas organization in 1911. After eight years as a salesman in Ohio and other states he became a sales correspondent in the Pittsburgh office. In 1927 he was transferred to Cleveland as sales agent and the following year was recalled to Pittsburgh as division sales manager. Last year he was appointed assistant sales manager at Pittsburgh. Mr. McDowell is a graduate of Penn State college. Prior to his connection with Universal Atlas he was with H. C. Fricke Coke Co., another subsidiary of United States Steel Corpn., and was employed on construction work in Indiana, Missouri and Nevada. He is well known in the cement industry and the construction field. In his new position as sales manager at Kansas City he has charge of Missouri, Kansas, Oklahoma, Arkansas, Nebraska and Iowa.

T. B. Warden, field engineer in Texas for the Portland Cement Assn., was one of the speakers at the celebration at Alvin, Tex., recently in connection with the opening of the new concrete pavement on State Highway No. 35.

Herbert L. Oakes has joined the engineering service department of the Lehigh Portland Cement Co., and will be located at Oklahoma City, Okla. Mr. Oakes was for more than five years senior designer of the Kansas State Highway department.

Nathan Lang of Charleston, Ill., and **Walter Niemeyer** of Humboldt, Ill., have purchased a quarry near Charleston, Ill., and are said to be installing crushing equipment.

W. N. Bosler, sales manager for the last six years for the Natural Rock Asphalt Co., of Louisville, Ky., has resigned to become assistant sales manager of the Kentucky Rock Asphalt Co. Mr. Bosler is a graduate of the school of engineering of the University of Notre Dame and was at one time engineer and construction superintendent for the Kentucky Highways Department.

M. T. Epling of Gallipolis, O., has purchased the gasoline sternwheel towboat "David" from the Union Sand & Gravel Co., of Huntington, W. Va.

R. A. Hummel, a vice-president of the International Cement Corp., New York, N. Y., after investigating the possibilities of establishing an island cement industry in Porto Rico, is reported to have started homeward from San Juan November 16. The island normally imports 400,000 bbl. annually.

Frank H. Smith, New York, N. Y., was guest of honor at a dinner November 15 at the Waldorf Astoria Hotel given by the executives of the different cement companies throughout the country in recognition of his service to the cement industry and his retirement as trustee of the National Cement Institute. Mr. Smith also has served two terms as president of the Portland Cement Assn. and was chairman of its board of trustees for many years. He is president of the Lawrence Portland Cement Co., of Northampton, Pa.

A. P. Marwick has been appointed sales manager of the Burnside Steel Foundry Co., Chicago, Ill. He had been connected with the sales department of the Taylor-Wharton Iron & Steel Co. of High Bridge, N. J., with his headquarters in Chicago.

Ralph C. Bird has recently joined the sales organization of the National Malleable & Steel Castings Co. to assist in selling its products to the cement industry. These products include electric cast steel of all kinds from plain carbon to the highest grades of heat-resisting chrome-nickel alloys. He will be located at the Chicago works, 1400 South 52d Ave., Cicero, Ill.

H. F. Hackedorn, Jr., who during the past 15 years has been active in the sale of building products to the steel industry, has been appointed vice-president and sales manager of the Lubrication Products Co., Burgettstown, Pa., an outgrowth of the reorganization of the company formerly known as the Journal Lubricator Co.

John L. Young, until recently district general manager in charge of the Pittsburgh, Pa., office of The Timken Roller Bearing Co., has been advanced to the position of assistant general manager of the Industrial Division with headquarters at Canton, Ohio. **Harry D. Robb,** who has been with The Timken Roller Bearing Co. since 1925 on sales engineering work in various territories, has been advanced to the position of district manager in charge of the Pittsburgh office, succeeding Mr. Young.

Harry H. Wood, who has been on The Timken Roller Bearing Co. engineering and sales staff in Canton, Ohio, since 1929, specializing in the application of Timken bearings in steel mills, has been transferred to Pittsburgh and appointed manager of the Rolling Mill Division.

Chas. W. Lovell has been appointed by the Portland Cement Assn. as its representative for the state of Kentucky. His offices will be in Louisville.

F. R. Kohnstamm has been appointed manager of the Lighting Division of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. He has been associated with the company in various capacities since 1917.

Harry C. Lewis, dealer in railroad and contractors equipment, announces the removal of his business to 325 Frelinghuysen Ave., Newark, N. J.

Mace Mair, for many years a member of the office staff of Gypsum, Lime & Alabastine, Canada, Ltd., Paris, Ont., has been transferred to the company's office in Toronto.

Obituary

J. E. Criddell, 40, employed at the plant of the Lynn Gravel Co. at Avalon, Miss., died recently after he had been caught in a cave-in of an embankment at the pit.

Frank S. Dunkelberger, 73, of Hyde Villa, Pa., an employe of the Berks Cast Stone Co., at its quarry near Temple, Pa., died recently from an infection which developed following a leg injury while at work in the quarry.

Newton B. Smalley, for forty-five years the active head of the Smalley Stone Co. of North Plainfield, N. J., died at his home there in December. Nearing his 76th birthday at the time of his death, Mr. Smalley had long been active in business and political affairs in North Plainfield, having served as mayor for eleven years.

E. D. Benjamin, secretary of the Standard Gravel Co. of Pontiac, Mich., died suddenly of heart disease in the office of the plant at New Hudson, Mich.

H. P. Phillips, 65, well-known and prominent resident of Hazleton, Pa., died November 27 after a few days' illness of heart trouble. Mr. Phillips was associated with his two sons in the operation of the Hazleton Sand & Gravel Co. of Hazleton.

MANUFACTURERS' PUBLICATIONS

Taylor Spiral Pipe. 4 pp. (Taylor Forge & Pipe Works, Chicago, Ill.) Describes and illustrates a line of spiral pipe of either riveted or welded construction for use in sand-and-gravel operations. Ask for bulletin 34-6.

Profits from Modern Bucyrus-Erie Machines. 64 pp. (Bucyrus-Erie Co., South Milwaukee, Wis.) A compact booklet of text, illustrations and specifications concerning the complete line of machinery produced by this company.

Collecting Dust the Modern Way. 4 pp. (Whiting Corp., Harvey, Ill.) Describes and illustrates a new cloth-tube dust filter of wide application in industry.

Modern Rebuilt and Guaranteed Machinery. 36 pp. (California Equipment Co., Los Angeles, Cal.) A catalog of construction, mining and industrial equipment, both new and used.

Better Refractories. 40 pp. (Mexico Refractories Co., Mexico, Mo.) Fire brick and other refractory specialties are described and illustrated in this new catalog.

Water Supply and Treatment. 144 pp. (National Lime Assn., Washington, D. C.) A comprehensive treatise on the utilization of lime in the treatment of industrial and municipal water supply.

Horizontal, Single-Stage Compressors. 16 pp. (Chicago Pneumatic Tool Co., New York, N. Y.) A new booklet giving complete details of a line of newly-designed compressors known as Type T.

Two-Stage Air-Coooled Portable Compressors. 20 pp. (Chicago Pneumatic Tool Co., New York, N. Y.) Illustrates and describes a new series of 2-stage, air-coooled compressors, either gasoline or Diesel driven.

Modern Money Saving. 4 pp. (General Electric Co., Schenectady, N. Y.) An illustrated folder describing the advantages of the metal-enclosed switchgear produced by this concern.

Worthington Centrifugal Pumps. 4 pp. (Worthington Pump & Machinery Corp., Harrison, N. J.) Describes and illustrates a series of single-stage volute centrifugal pumps.

The Brush Phase of Motor Maintenance. 64 pp. (Ohio Carbon Co., Lakewood, O.) An informative booklet written particularly for those responsible for the proper operation and maintenance of electrical machinery in the plant.

A New All-Purpose Conveyor. 4 pp. (Kewanee Machinery & Conveyor Co., Kewanee, Ill.) Describes and illustrates a portable chain-and-flight conveyor.

Drilling and Fishing Tools. 48 pp. (Bucyrus-Erie Co., South Milwaukee, Wis.) A complete catalog of the Bucyrus-Armstrong line of drilling tools. Also includes instructions for sharpening bits, splicing cables, and other valuable data.

Hydroseal Maximix Sand Pump. 12 p. (Bull. No. 634, Allen-Sherman-Hoff Co., Philadelphia, Pa.). Describes and illustrates the Hydroseal sand pump with Maximix rubber lining.

Dust Arrestors. 4 p. (Bull. No. DA-5, Parsons Engineering Corp., Cleveland, O.). Describes and illustrates the Parsons oval bag dust arrestors.

Longyear Core Drill. 8 p. (Bull. No. 37, E. J. Longyear Co., Minneapolis, Minn.). Describes and illustrates the Longyear Prospector, an improved light core drill.

Raymond Kiln Mill. 8 p. (Raymond Bros. Impact Pulverizer Co., Chicago, Ill.) Describes the application of the various types of Raymond kiln mills to the drying and grinding of different materials.

American Eagle Crane. 12 p. (Cat. No. 74, American Hoist & Derrick Co., St. Paul, Minn.) Describes and illustrates the American Eagle crane and its application to different uses.

American Equipment. 16 p. (Cat. No. 73, American Hoist & Derrick Co., St. Paul, Minn.) Describes and illustrates the various types of equipment made by this company including, cranes, hoists, derricks, etc.

Fairbanks-Morse Diesel Engines. 42 p. (Bull. No. 3010, Fairbanks, Morse & Co., Chicago, Ill.) Describes Diesel engine installations for various purposes and the economies effected. Illustrations and tables profusely used.

Technicoal—Modern Fuel. 16 pp. (Technicoal Sales Corp., Cleveland, O.) Describes the cleaning process and chemical treatment involved in preparing "Technicoal," together with an analysis of the fuel and a discussion of its advantages in firing rotary cement kilns.

Construction Progress on PWA Roads Reported

Progress made on emergency construction of public works highways to January 5 under the supervision of the U S. Bureau of Public Roads shows a total of 513 projects, estimated to cost $24,932,000, approved but contracts not yet awarded; 853 projects, estimated to cost $37,482,000, awarded but not yet under construction; 2,393 projects, estimated to cost $146,690,000, under construction; and 7,407 projects completed at a cost of $323,732,000.

The 2,393 projects under construction involve 6,861 miles of road and are giving regular direct employment to 95,017 men.

The above figures include projects involving funds provided by the Acts of June 16, 1933, and June 18, 1934.

The Walsh Equipment Co., dealer in new and used plant equipment, for many years located on Berea Road, Cleveland, has moved to 3088 West 106th St., Cleveland.

Harnischfeger Observes 50th Year in Business

More than 1,000 visitors, including many important industrial executives, engineers and technicians from throughout the mid-west area were open-house guests of the Harnischfeger Corp. at Milwaukee on November 17, an occasion which marked the high spot of the company's 50th Anniversary celebration.

Among the interesting features of the afternoon's program was the exhibition of the newest P&H models going at top speed on the test field adjoining the plant. Here visitors had an opportunity to see the smallest P&H model, a ⅜-cu. yd. gasoline shovel, operating beside the largest model, a 4-cu. yd. Ward Leonard electric drive. A 3½-cu. yd. Diesel-powered drag-line added its share to this ground-churning jubilee.

The four 300-ton electric cranes just completed in the Harnischfeger shops for the U. S. Government for installation at Boulder Dam were also shown. These units, which will comprise the largest single power-house crane installation on record, will be used for handling the mammoth 600-ton hydro-electric rotor generators, the largest of their kind ever built.

New Corporations

TAMPA PHOSPHATE CO., INC., Wilmington, Del. Capital $100,000 and 1,000 shares n.p.v. Incorporators, M. M. Lucey, H. I. Brown, and L. S. Dorsey, Wilmington, Del. General mining.

THE VICTORIA GYPSUM CO., LTD., Windsor, Nova Scotia, Can. Allan N. Davison, West Roxburn, Mass., is one of the incorporators. To mill, reduce and develop gypsum deposits in the Windsor territory.

OKLAHOMA ROCK ASPHALT CO., Sulphur, Okla. Capital $25,000. Incorporators, R. L. Elton, Frank Lewis, Sulphur; Harry J. Lyons, Oklahoma City, Okla.

UNITED GRANITE CO., Troy, N. Y. Operated by Louis Bonelli, 1454 Seventh Ave., Troy, N. Y.

CAMPBELL LIMESTONE CO., Knoxville, Tenn. Incorporators, R. S. Campbell, Charles D. Snepp, and Charles M. Seymour.

THE NEWDALE MICA CO., Raleigh, N. C. Capital $50,000, of which $2,000 was subscribed by W. F. Densen, Johnson City, Tenn., R. W. Lawson, Erwin, Tenn., and L. L. McIntre, Jr., Micaville, N. C. To mine and manufacture mica, feldspar, kaolin, and other minerals.

NEOLITHIC PRODUCTS CO., Wilmington, Del. Capital $100,000—1,000 shares n.p.v. To deal in stone and cement products.

EASTERN CEMENT STONE CO., Boston, Mass. Capital 1,000 shares n.p.v. Incorporators, David O'Rourke, Medford, Mass.; Elsie L. Cordingly, Lynn, Mass.; and Alice M. Keating, Dorchester, Mass.

PEAPACK LIME CO., INC., Trenton, N. J. Capital $25,000. Agent, Alvah M. Alpaugh. To deal in lime and stone.

▼ *Coming Events* ▲

January 22-25, 1935, Washington, D. C.—Annual Convention and show, American Road Builders' Assn., Willard Hotel, Washington.

January 27, 1935, Chicago, Ill.—Independent annual meetings of the directors of the national crushed stone, sand and gravel and slag associations. Palmer House.

January 28, 1934, Chicago, Ill.—Meeting of the Code Authority of the mineral aggregates industries. Palmer House.

January 28-31, 1935, Chicago, Ill.—Independent conventions of National Sand & Gravel Assn., National Crushed Stone Assn., and National Slag Assn. with some joint sessions. Palmer House.

February 1, 1935, Chicago, Ill.—Meeting of Executive Committee or Council of the Code Authority of the mineral-aggregates industries. Palmer House.

June 24-28, 1935, Detroit, Mich.—Annual convention, American Society for Testing Materials, Book-Cadillac Hotel.

New Machinery and Supplies

ON this and the following pages are included some of the outstanding developments of the year 1934 in new equipment for the operator. In most instances these new pieces will enable the producer to turn out a better and more salable product at lower cost, while the development of such equipment has cost the machinery makers no small sum in research and experiment. Throughout the last five years of economic lassitude, the makers of equipment serving the pit and quarry industries have been wide awake and have not lagged in their efforts to provide users of equipment with better and more efficient tools with which to work. Those machines mentioned and illustrated here represent a mere cross section of what has been done during the year, lack of space, of course, preventing the inclusion of each and every development on record.

EXCAVATING . . . HANDLING

Shovels Available with Rope or Chain Crowd

The new model General Excavator, in ½ and ⅝ cu.yd. sizes, and its running mate, the Invincible, in ⅝ and ¾ cu.yd. sizes, are now available either with General's patented rope-crowd, shovel-boom assembly, which has been so successfully used on hundreds of preceding Generals, or with chain-crowd, shovel-boom assembly. Boom assemblies for trench or pull shovel, skimmer, clamshell, dragline, pile driving, magnet and all crane work are available. To change the boom assembly from one type of work to another, it is not necessary to change anything within the cab, just change the boom and re-reeve the ropes.

The shovel boom, whether for rope or chain crowd, is of all-steel construction, 18 ft. long between centers for the chain crowd, and 19 ft. 7 in. long between centers for the rope crowd. The handle is of the outside stick type; the stick of composite oak and steel construction. The handle is 14 ft. long.

The position of the lugs on the deck casting for hinging the boom, the location of the shipper shaft on the boom, the use of the outside sticks, etc., give these machines a remarkable operating range.

When the chain crowd is used, the deck machinery unit is placed immediately ahead of the shaft carrying the swinging clutches. This unit includes two outside band type clutches actuated by General's "easytouch" mechanism, and a large band-type brake. The ratios are proportioned to give a powerful crowd and speedy retract. With this arrangement the operator can vigorously shake the bucket.

New lines are found in the cab. The roof and the rear end are now curved, and the roof is aluminum-painted, which by reflecting the sun's rays keeps the inside of the cab cooler. The radiator fan may be of the push or pull type, which enables the operator to further control the temperature within the cab.

A portion of the counterweight is bolted to the rear end of the machine. When operating conditions warrant the use of a lighter weight machine this counterweight casting may be removed. The fact that all machinery is set back of the center pin allows these machines to handle exceptionally large loads when being used as a crane.

Haiss Develops Loader and High-Power Bucket

The Model 135 Loader was developed by the George Haiss Mfg. Co., Inc., during 1934, it being desired to produce a machine having a capacity of around 5 cu.yd. a minute. This machine is patterned after the well-known creeper-mounted Haiss loader in the sense that it is caterpillar-mounted and it is equipped with the Haiss patented feeding propellers, and has a slow-speed crowding drive that allows the machine to dig into the pile at the rate of three or four feet a minute. The machine weighs 20,000 lb. when equipped with a gasoline engine which develops 65 hp. It can also be equipped with a Waukesha Hesselman oil engine which has the advantage of burning oil rather than gasoline and therefore operates at considerably less cost per yard of handled material. Buckets are 36 in. long and 13 in. wide, reinforced with cutting lips. The sprockets and chain are manganese. Only one man is required to operate the machine, as all handles and levers are placed in a convenient position on a platform.

The latest development of Haiss Hi-Power buckets has heavily constructed jaws and a new lower sheave casting so designed that any material that falls on the sheaves will not be locked or contained in the casting but, because of the top contour, falls off into the bowl of the bucket. The construction of this bucket is such as to give great digging power without unnecessary surplus weight. All bearings, pins, sheaves, etc., are larger than ordinary and well equipped with Zerk lubricating system. All shafts, pins, etc., are of nickel steel and of large diameter.

Haiss loader with a capacity of 5 cu. yd. per minute.

The Haiss company also redesigned and improved its line of portable beet conveyors during the year. Timken-equipped tail pulleys are now standard on this equipment and an overhead raising and lowering device aids in conveying loads to high positions.

General's new Invincible excavator.

Heavier jaws feature this new Haiss bucket.

Two New Excavators Produced by Bay City

During the past year, shovel model numbers of Bay City Shovels, Inc., which had formerly been designated both alphabetically and numerically, were changed to a numerical basis, as a matter of uniformity. Two new models—a heavy-duty ½-cu.yd. and a light ¾-cu.yd.—were added to the line. Improvements and refinements in the nature of an increased number of frictionless roller bearings, the use of helical cut gears throughout, 6-cyl. gasoline power, optional Diesel power for all full-revolving models and drop-forged crawler shoes on ½-cu.yd. models in addition to improvement in cab design were the important changes and improvements during 1934.

Strictly new Bay City models were No. 38, a heavy-duty ½-cu.yd. job, weighing 38,000 lb., equipped as shovel with drop-forged crawler shoes; and Model 42, a standard ¾-cu.yd, with a shovel working weight of 42,000 lb. Both of the above machines are designed with frictionless bearings throughout and positive chain crowd and drive. All drum gears are helical cut.

Hydraulically-Cushioned Clutch on New Shovel

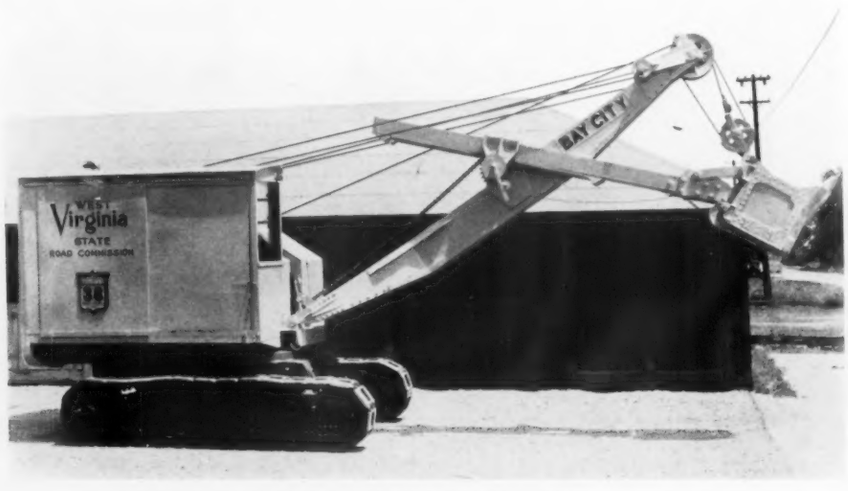
The Koehring Co., Milwaukee, Wis., has just announced its new 801 shovel, a 2-cu.yd. model. One of the most important features of this machine is the hydraulically-cushioned clutch which is said to set firmly without shattering, is positive without constant adjustment, taking hold of the load with smoothness and ease, eliminating jerking of machinery and physical strain of operator. It is of the double-band self-energizing power type with two bands of the same diameter. This type of clutch can be set with the machinery stationary, which is an important advantage when setting steel or handling loads as a crane.

The primary or energizing band when engaged does not slip but carries its share of the driving load, reducing the work and wear of the secondary band instead of merely serving as an engaging member.

Koehring's new Model 801 shovel.

The 801 shovel is, of course, equipped with an exclusive Koehring boom foot shock absorber which cushions and absorbs shocks received from sidewise pressure against the dipper. A heavy, cast-steel gudgeon rotates in a bored gudgeon journal against spring compression either way. The high "A" frame is raised or lowered for operation or traveling by power.

Other important features are the Koehring all-steel full-length multiplanes which have no mud pockets or gravel traps, the accident-proof traction lock, independent drums independently operated and mounted on independent shafts, raising and lowering the boom by friction clutch control by means of a simple lever shift.



One of Bay City's new shovel models.

Engine Vacuum Controls Clutches on Excavator

An entirely new application of a well-known force has been brought out by The Osgood Co. of Marion, O., and successfully applied to the operation of its various size power excavators.

In this application, vacuum created by the engine is employed to actuate the swinging clutches. The simplicity of this new method of operating clutches is almost unbelievable. Vacuum is taken from the engine and led to the operator's position, where it is controlled by an extremely simple and highly efficient valve. With this new control, utilizing power already on the machine, with absolutely no sacrifice of power from the prime mover; the effort required to swing the machine and travel the machine is virtually nil. A pressure or pull of not to exceed 2 lb. is ample to effect the required motion be it swinging or traveling and the force exerted through the clutches is applied with a soft velvety motion which instantly accomplishes the required effect and does it in a smoother and more efficient way and in a manner which is less wearing on the clutches than any method hitherto employed.

A flexible line is led from the manifold on the engine to a reservoir conveniently located, which reservoir stores up enough vacuum so that the clutches can each be operated several times, so there is always energy at hand for use during all periods of the cycles of operation.

This energy derived from the engine and controlled as before mentioned by the operator is applied to the clutches through the medium of an arm which is connected to a cylinder, which cylinder instantly and efficiently operates the clutch whenever the power is applied to it through the control valve previously spoken of.

Only one valve is used and only one lever is necessary to operate this valve. It is of the two-way type and a movement forward of the short lever operating the valve instantly swings the machine to the right and a similar movement of the short control valve in the opposite direction instantly swings the machine to the left. The length of travel of this short control valve does not exceed 3 in.

This operating control device can be put on any Osgood in the field and is available on all new Osgood machines. The vacuum used to operate the cylinders which in turn control the clutches is but a tiny part of that created by the engine and its use in no respect whatsoever impairs or detracts from the efficiency of the prime mover.

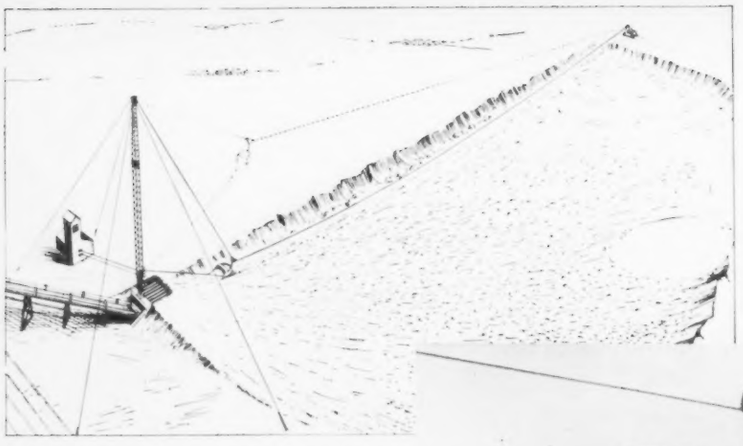
Slackline Excavator for Low-Cost Production

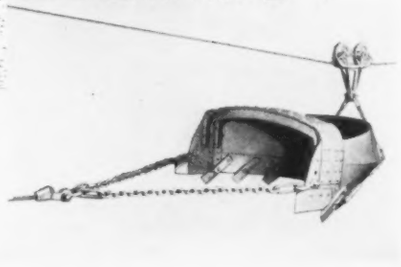
The Sauerman slackline scraper excavator, the latest addition to the group of long range excavators manufactured by Sauerman Bros., Inc., 434 South Clinton St., Chicago, is a low-cost unit for moving earth and bulk materials distances from 200 to 1,500 ft.

As its name implies, this new machine is a combination of two familiar types of excavators—the power drag scraper and the slackline cableway.

The bucket furnished with the excavator is the well-known Crescent scraper. The scraper bucket is attached to a carrier which rides on a track cable. The method of operation resembles that of the standard drag scraper as far as digging and conveying is concerned, but in the dumping operation the bucket is lifted into the air by tightening the track cable, and the force of gravity is utilized to carry the empty bucket back to the digging point. This speeds up the operating cycle and results in a larger hourly handling capacity than is attainable with an ordinary scraper installation where the bucket is dragged back over the ground.

When used in the production of gravel, the Sauerman slackline scraper is operated from a stationary mast. For stripping overburden and similar work the machine is operated between a traveling



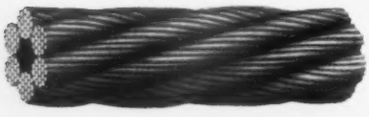


RIGHT—The Sauerman slackline scraper bucket.
ABOVE—Sketch showing application in moving gravel from pit to hopper or crusher.

head tower, from 80 to 130 ft. in height, and a low tail tower. A maximum hourly capacity of 600 cu.yd. can be attained with the largest of these machines.

High Elasticity Found in Steel Spudder Line

The MacWhyte Co., Kenosha, Wis., late in 1934 developed a new "Hi-Lastic" spudder line made of mild plow steel for use in water well and blast-hole drilling. This new spudder line has three times the stretch of standard drilling line and has been used successfully in wells running



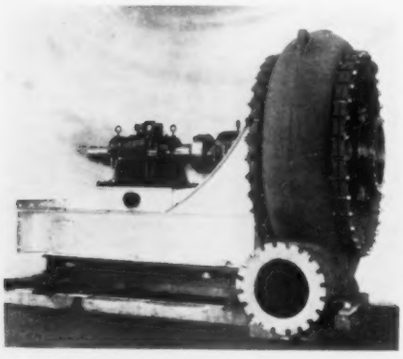
Sectional views of the MacWhyte spudder line.

between 500 and 1,000 ft. deep. The manufacturer claims they have enough spring to do the work quickly and efficiently as manila, and they have the advantage of withstanding greater abrasion, thus giving longer and better service. Their stretch permits use without splicing a manila cracker on the end. Hi-Lastic is 6-strand, left-lay construction, with 19 wires to the strand. It comes in 2 sizes: $\frac{5}{8}$ in. (breaking strength, 13.1 tons) and $\frac{3}{4}$ in. (breaking strength, 18.7 tons).

Morris Produces 20-In. Centrifugal Dredge Pump

A 20-in. centrifugal dredging pump was one of the outstanding productions of the year at Morris Machine Works. Turbine drive is employed—either 1,000 or 1,500 hp. The pump is driven through reduction gearing and flexible couplings, operating at 350 r.p.m. with 1,000 hp. and 400 r.p.m. when driven by a 1,500 hp. turbine.

As the illustration shows, the thrust is taken by a Kingsbury bearing. In order to keep the weight at a minimum, the sub-base is fabricated of structural steel, all joints being welded.



A 20-in. dredge pump produced by Morris.

Diesel Crane Has Three Speed Travel Mechanism

The Industrial Brownhoist Corp., Bay City, Mich., announced its new No. 8 35-40 ton Diesel crane which has been designed from the tracks up for Diesel (or gasoline) power. It incorporates many interesting construction features and is said to be extremely quiet in operation. The machine is equipped with a 3-speed travel mechanism so arranged as to have only the travel gears turning when the crane is traveling. This crane is equipped for bucket, hook or pile driver service.

Dragline Bucket Features Big Range and Output

The Northwest Engineering Co., Chicago, Ill., manufacturers of shovels, cranes and draglines, produced a new dragline bucket as part of their line. This bucket is designed to increase working ranges and output in earth excavation and is of lightweight construction with a wide mouth. It embodies the heat-treated arch which is made of a heavy I-beam section and the lip is of rolled alloy steel, also heat treated. This bucket is built in 3 sizes, 54, 67½ and 81 cu.ft. capacities, struck measure.

Convertible Utility Crane Has High Transport Speed

The Harnischfeger Corp., Milwaukee, Wis., announced a new-type general utility crane known as the "Hustler," which is said to combine high transporting speed with unusual capacity and stability. It is also convertible to clamshell crane, dragline, pile driver or tractor service. One of

Harnischfeger general-utility crane.

the features is the flexible drum arrangement, the two side drums and the front drum each rotating independently. Each drum has three forward speeds and one reverse. The 3-speed traction gives speeds ranging from 1.3 to 5.2 miles per hr.

Low Power Consumption in Pneumatic Pump

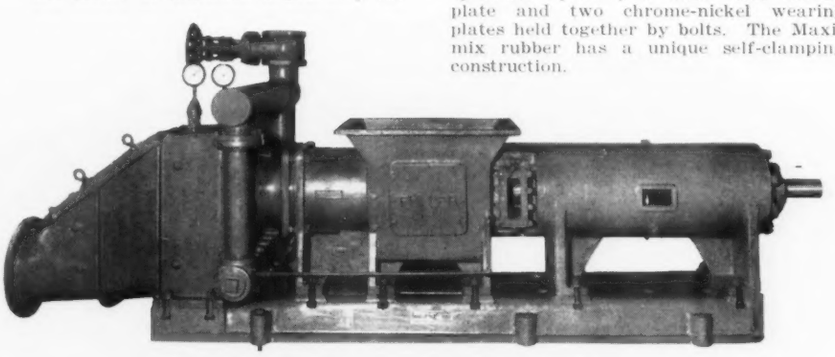
The new Type H Fuller-Kinyon pump, announced in 1934 by the Fuller Co., Catasauqua, Pa., is a development of the Type F, which was placed on the market about two years ago. Among the advantages claimed are considerably decreased power consumption, as compared with all previous types, whereby the total power input to both the driving motor and air-compressor compares favorably with me-

Industrial-Brownhoist 35-40-ton Diesel-engine crane.

chanical systems on short distances and offers increasing savings as the conveying distance increases. It was especially designed to use low-pressure air and to operate under stable conditions at all rates of feed. It has been found, accordingly, to be economical in power regardless of irregularity in the rate of material delivered to it.

The theory of operation is precisely the same as that of all Fuller-Kinyon pumps, but a variable mechanical seal, comprising a check or flap valve, has been added. This assists in creating a seal of minimum density under all capacity conditions, whereby the friction load is considerably decreased and the wear on the parts accordingly reduced. The design minimizes any danger from tramp iron or other foreign materials, and this, together with the low material friction, is said to have made maintenance a negligible factor.

Among the mechanical improvements are changes in the design to allow ready removal of the screw through the front wall of the flap-valve body without disturbing the bearing assembly or any other parts of the pump.

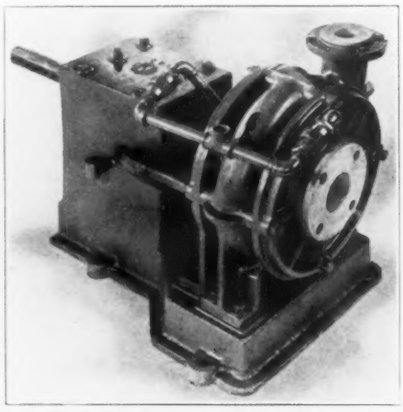


Fuller-Kinyon Type H pump for transporting pulverized materials.

The base plate, bearing plate and lower bearing housing, are integrally cast and the base plate carries the pump and driving unit (if the pump is direct-connected) on machined pads. The pump shaft is of cold drawn steel with a steel disc shrunk thereon to resist thrust in either direction. The impeller is of the three-blade type made up with a cast steel hub disc, three synthane spacers, a mild steel shroud plate and two chrome-nickel wearing plates held together by bolts. The Maximix rubber has a unique self-clamping construction.

Rubber Protects This Pump from Abrasion

The Allen-Sherman-Hoff Co., Philadelphia, Pa., presented the Hydroseal Maximix protected sand pump for which it is claimed that none of the abrasive material pumped can wear or even touch any metal part of the pump. This pump incorporates the Hydroseal pumping principles with Maximix rubber protection. The impeller and the entire pump casing are moulded of this rubber, the metal shell merely serving to hold the rubber casing in place. These parts are easily replaced in the field as no vulcanizing is required and they cannot leak so no abrasives can collect between the metal and the rubber parts. All metal parts of this pump, except the bearings, shaft, etc., are made of aluminum alloy.



Hydroseal rubber-lined sand pump.

Trunk Shovel Designed for Small User's Need

The Michigan Power Shovel Co., Benton Harbor, Mich., has produced a truck shovel which is designed to meet the demand for a unit of small size which can be readily and quickly moved from place to place. This shovel moves under its own power at speeds up to 20 mi. per hr. and is always ready for work. In addition to portability features of this shovel are full-circle loading, no tail swing, and short wheel base. This unit can be converted into a truck crane in about two hours' time by merely substituting a 25-ft. crane boom for the regular shovel boom and dipper sticks. The crane unit may also be equipped with a dragline bucket.

The power plant is a 50-hp. Continental 4-cyl. gasoline engine but a 60-hp. heavy-duty, 6-cyl. Hercules engine can be supplied. Balloon tires are standard with dual tires on the rear wheels, and hydraulic brakes are used on all four wheels. The transmission is of the heavy-duty automotive type with four speeds forward and one reverse. Timken wheel bearings are used and electric starting and lighting equipment is standard. The shovel has a gross weight, with a 4,000-lb. counterweight, of 20,000 lb., and has a wheel base of 139-in. and an overall width of 7-ft. 11-in.

The turn-table mechanism is full-revolving but the power plant remains stationary. The frame is of heavy ship channels braced with cross beams, all riveted and electric welded. Crowd and hoist brakes are enclosed and of the internal expanding type and double disc clutches are used. The crowding mechanism has a positive chain drive with equalizer adjustment mounted on shipper shaft bracket. The circle gear and center post are cast integrally of electric steel. In addition to the hoist and auxiliary drums a drum and clutch assembly for crane, clamshell and dragline work is part of the standard equipment.

Convertibility a Feature of Revolving Excavator

The new 10-B, ¾-cu.yd. excavator, a 1934 development of Bucyrus-Erie Co., South Milwaukee, Wis., is fully and quickly convertible, and is offered with all types of front end equipment as a shovel, dragline, crane, clamshell, drag shovel, skimmer scoop, back filler, or pile driver. Full-revolving, the 10-B offers practical working ranges that are said to compare favorably with larger machines. The shovel with standard boom at 45 deg. has a maximum cutting radius of 20 ft. 3 in., a clear dumping height of 12 ft. 6 in. The crane rating at 10 ft. radius is quoted at 7,000 lb. Dragline and clamshell easily handle a ⅜-cu.yd. bucket on a 28-ft. boom.

The machine weighs only 7½ to 8 tons depending on the equipment used. This light weight and the compactness of the machine have been secured by utilizing high quality, heat-treated, alloy steels with welded construction and simplified design.

Speeds to 4¼ mi. per hr. are available and the machine is said to steer accurately through friction clutches as readily as a tractor, making long, short or right-angle turns. It also climbs grades even steeper than 30 per cent. Among the many mechanical features are automatic lubrication; ball and roller bearings throughout; elimination of center pintle by the hooked-roller swing-circle; a new type of boom construction; new dipper; and power dipper trip.

A new stripping shovel, the 950-B, with dippers up to 22 cu. yd. and a working weight of 2,400,000 lb., was also recently announced by Bucyrus-Erie Co. Unusual in output capacity and working ranges, the 950-B is readily convertible to shovel or drag-line operation, and is said to have the fastest digging cycle yet offered in machines of its class. It is available with booms up to 110 ft. in length, with dipper handles up to 70 ft. long, and with dippers of 14 to 22 cu. yd. capacities—as may be required to suit pit conditions.

Unique Features Found in New Blasting Machine

The Atlas Powder Co., Wilmington, Del., announced the development of the "Twin Fifty" blasting machine which not only has capacity to fire one hundred electric blasting caps but has other unique features which enable the blaster to secure greater effectiveness.

Blasting machines such as the Atlas No.

Bucyrus-Erie full-revolving convertible excavator.

3 with a specially designed shunt winding have ample power to fire fifty 30 ft. copper wire electric blasting caps if the blasting machine is operated correctly and the entire blasting cap circuit has sufficient insulation to prevent current leakage. By the design of a special double switch and the addition of a third binding post to the Atlas No. 3 blasting machine it has been possible to utilize the unused current to fire a second series of electric blasting caps. The only additional equipment required is an extra leading wire. The firing of the second series follows the first so closely that the time interval between the firing of the two series cannot be detected by ear and the two series seem to fire as one.

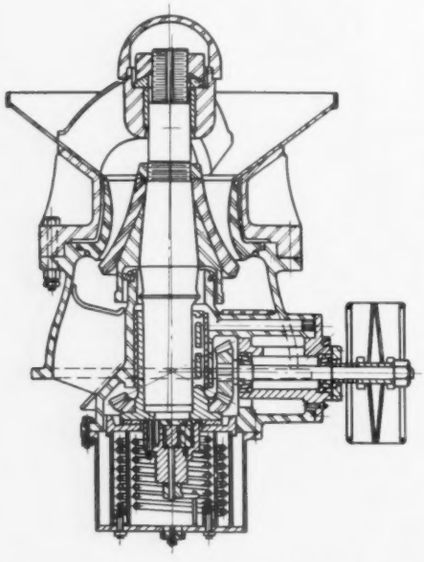
In certain kinds of blasting such as fill settlement and some quarry blasting it is said to be sometimes possible to take advantage of this time interval and fire one row of bore holes a very small fraction of a second before another, thereby obtaining improved results. The change in the blasting machine in no way interferes with its use to fire a single series.

CRUSHING . . . GRINDING

Develops Crusher, Dust Arrestor and Burner

During 1934 Traylor Eng. & Mfg. Co. improved its non-chokable bell head and curved concaves for crushers and made many installations of new TZ and BH machines, as well as replaced old-style fittings with this new type in large numbers of older designs of gyratory crushers of all makes. Many remarkable production records have been made by the use of these bell head and curved concaves.

Traylor recently added to and rounded out its line of bell-head-fitted gyratory crushers by the introduction of a new small size machine of improved design intended to afford all the advantages and economical performance of the Traylor advanced type of reduction gyratory



Cross-sectional drawing showing Traylor's newest gyratory crusher—a small machine of improved design.

crusher to the operators of the smaller crushing plants, where the sizes previously offered would be found unnecessarily large.

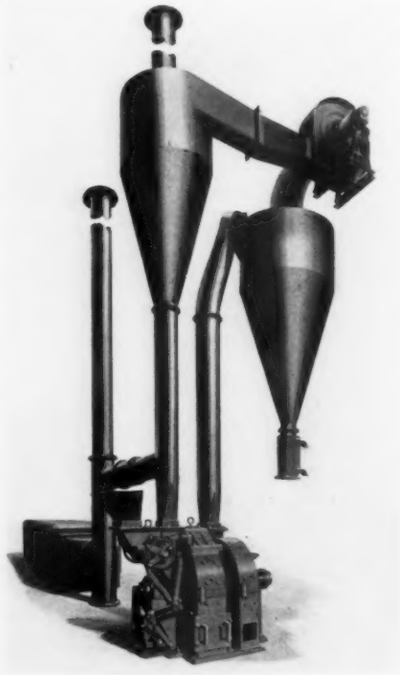
This little crusher is of extremely compact and sturdy construction, occupying minimum head room and floor space. The crusher is made with an all cast-steel frame, and has the spider, hopper and top shell cast in one piece.

This crusher is available in one size only, having a 20-in. diameter head and a nominal feed opening of 3 in., which may be varied slightly. The discharge opening may be adjusted from ⅛ in. to 1 in., on the closed side, and the capacity range is from approximately 6 tons to ⅛ in., to about 29 tons to 1 in. The crusher weighs about 9000 lb., operates at 900 r.p.m. of the countershaft, and requires 10 to 25 h.p. for driving, depending upon the hardness of the material being handled.

Among other Traylor developments during 1934 was the acquisition by the company of the rights to develop and sell the Lang dust arrestor, or calcinator, a machine designed for the purpose of utilizing cement-kiln waste gases to raise the temperature of slurry.

The apparatus is designed for use with medium length kilns, and consists of a revolving drum enclosed in a housing which rests on top of the flue chamber of the kiln. The gases, after entering the flue chamber, rise and strike the bottom half of the revolving drum, thus heating the outside. They then enter port holes at one end of the drum and pass through the drum, escaping on the other end through similar port holes. These gases are then drawn by a conduit into the suction fan, which is required for most installations in order to get the necessary draft.

The material is fed by means of a bucket-wheel feeder and falls into a screw conveyor mounted on a horizontal shaft that passes through the drum and which is located below the center of the drum axis. This screw conveyor then feeds the material into the center portion of the revolving drum. Here the slurry is precipitated by paddles mounted on the screw conveyor shaft. This shaft runs in excess of 200 r.p.m. and the entering slurry is practically atomized and projected against the inside of the shell. The hot shell immediately dries the slurry, which would fall off in cakes were it not for the fact that the outer ends of the paddles just clear the bottom of the drum. Hence the paddles not only atomize the incoming slurry but they also disintegrate the dried slurry adhering to the drum.



Hammer-type kiln mill equipped with Raymond flash-drying system.

The hot gases passing through the drum therefore come into most intimate contact with the slurry. They immediately remove the moisture which passes out with the effluent gases into the exhaust fan. The spray of the slurry is so fine and covers the entire cross section of the drum so that no dust can possibly escape, and whatever fine material is dried and would tend to float is picked up by the moist slurry. Practically no dust escapes into the exhaust flue.

In connection with this improvement for the treating of slurry prior to feeding into the kiln Traylor has also recently developed new burning equipment known as the Cheesman burner, designing this burner for coal, oil or gas. Where the burning equipment has been installed using coal, a reduction in the fuel requirements of 200,000 B.T.U. per barrel has been realized.

The burner is particularly adaptable to rotary kilns where heat is to be recovered from the product and where air for combustion is raised to high temperatures. Where it has been the practice to introduce from 15 to 20 per cent of the air necessary for complete combustion with the fuel, it has been proved that by introducing 80 to 100 per cent of the air required for combustion with the fuel, an increased kiln production of as much as 40 per cent has been noted. The flame and temperature condition within the kiln in this case could be controlled principally by regulating the velocity of the combustible mixture entering the kiln.

Flash-Drying System Utilizes Kiln Mill

The Raymond flash-drying system is a new application of the kiln mill, and the unit consists of a standard Imp pulverizer, which is a hammer-type mill, equipped with a heater for supplying hot gases to the system. Since the Imp pulverizer is a sturdily built machine, it is capable of operating under much higher temperatures than the ordinary roller-type kiln mill. As the products of combustion from the furnace (oil, gas, coke or coal fired) are drawn into the mill by the exhaust fan of the air separation system, the hot gases mix with the air used for separation, moderating the temperature. The arid air passes through the finely-divided material that is pulverized and removes the moisture, venting at the top of the system. By means of dampers and temperature regulators, the ingoing air can be controlled within close limits, thus giving an accurate drying action upon the fine material. In taking the water of crystallization from copper sulphate for example, it is possible to remove four of the five molecules of water, leaving a monohydrated copper sulphate. The same operation is used on gypsum. This is a calcining process that removes both the free and the combined moisture. Another example is handling sludge from sewage plants. This mud-like substance contains about 90 per cent. of moisture, which can be removed by passing the sludge through the kiln mill and made into a burnable powder suitable for the incinerators. A given amount of material, dried in suspension, in this way, takes about ten seconds to pass through the mill in becoming dry. The time to go through an ordinary dryer, in lump form, requires about forty minutes for a similar amount. Such savings are possible in drying clay, especially heat treated clays, and many other non-metallic minerals. The chief differences between the present flash drying system and the former kiln mill operations are higher temperature, higher velocity, closer control, and the ability to handle materials containing up to 85 or 90 per cent. of moisture.

Fahrenwald Jaw Crusher Meets Definite Need

A new line of single- and double-jaw crushers, employing numerous refinements and radical departures from the ordinary Blaketype crusher, has been introduced by the Eastern Iron & Metal Co., Salt Lake City, Utah.

The crushers are being produced under the trade-name "Fahrenwald" and were developed to meet very definite operating needs, conditions and requirements. Foremost in mind were:

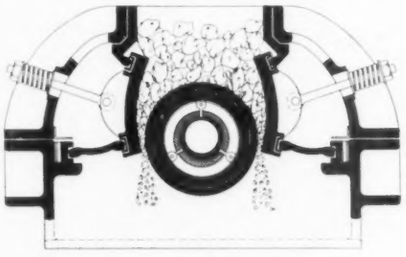
1. Protection from steel objects in the feed.
2. Large reduction ratio combined with ability to do both coarse and fine crushing in primary or secondary work.
3. Large capacity per unit of weight and jaw width.
4. Uniform finished product.
5. Mechanical simplicity and ruggedness.

Fahrenwald crushers are all-steel throughout with heavy SKF anti-friction bearings. Other mechanical features include unit drive, three-point lubrication and quick, simple adjustment of "set."

Details of operating performances may be had by addressing the company.

Creeping Action Used in Reduction Crusher

The Bonnot Co., Canton, O., brought out a new reduction crusher which incorporates many distinctive features. The main feature is that the crusher cylinder or mantle does not revolve but has a slight creeping action which insures uniform distribution of wear around the entire circumference. Other features are: manganese wearing parts, reversible concaves, cast steel frames, bronze sleeve bearings, renewable liners, extra large alloy steel shaft, positive pressure lubrication, and cast iron safety or breaker plates.



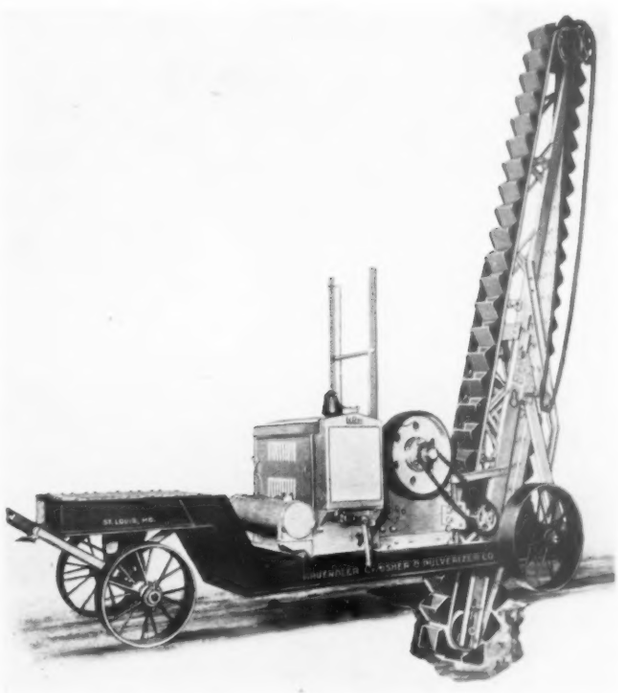
Bonnot non-rotating reduction crusher.

The simplicity of this crusher is one of its outstanding characteristics. No gears, countershaft or eccentric sleeves are required in the driving or crushing action. Lubrication is by positive force feed with a separate feed and individual adjustment for each bearing. All wearing parts are manganese steel and accessible for renewal. The crusher is made in two sizes. The 4½-in. by 24-in. unit has a rated capacity of 15 to 25 tons per hour at ½-in. setting and 45 to 55 tons per hour at 1½-in. setting. The 4½-in. by 36-in. crusher has capacities of 30 to 40 and 70 to 90 tons per hour at the same settings.

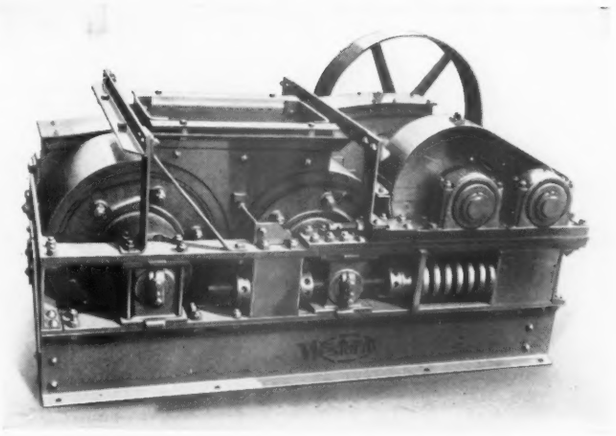
Mounts Portable Plant on Box-Girder Frame

The Gruendler Crusher & Pulverizer Co., St. Louis, Mo., developed a portable crushing plant which can be used alone or in connection with various types of screening equipment where a more complete plant is required. The entire unit is mounted on a structural box girder type frame mounted on steel-spoke wheels. The frame is mounted over the front wheels to allow steering the machine when in transit and drops to a low level back of the wheels to give the lowest practical feed elevation to the crusher. The frame is underslung at the rear axle.

The Gruendler jaw crusher is driven by a LeRoi gasoline engine which is fully enclosed and is mounted on the frame next to the crusher. A chain drive from the crusher drive shaft drives a short shaft from which a belt bucket elevator is driven by chain and sprocket through a third chain drive. The first drive shaft is so located that the elevator can be swung on its pivot from its operating position to a horizontal position when the plant is to be moved, without changing the tension in the chain between the first and second drive shafts. Because of this arrangement the plant can be set up on taken down very readily. All that is necessary to put this plant into operation at a new location is to dig a small pit from which the bucket elevator can take the crusher discharge. A steel brace mounted on the frame supports the weight of the elevator when in transit.



Gruendler aggregate-crushing plant of new design.



Reduction roll crusher designed to operate at higher than usual speeds.

New Reduction Crusher Designed for High Speeds

A new reduction roll crusher, built primarily to produce material from 1½ in. down to dust (though it will handle larger sizes) was announced in 1934 by the Austin-Western Road Machinery Co. of Aurora, Ill. According to the manufacturers, it requires less power and since it operates faster (60 r.p.m.) its capacity is therefore greater.

The rolls measure 18 in. wide by 30 in. in diameter and are equipped with 2 in. thick, removable, manganese shells. Each roll is supported by two, large SKF, self-aligning, roller bearings, that rotate on heavy stationary shafts. These bearings are located inside the rolls, close to the outer shaft supports to materially reduce shaft load.

All crusher shafts, when operating under load are subject to a certain amount of deflection which if not corrected will cause premature and excess wear or heating; such conditions cannot develop in this crusher because the bearings can never get out of alignment.

Two massive screws (heavy-spring equipped) permit any desired adjustment of rolls and act as safety releases against tramp iron or other uncrushable material.

Belt driven pulley shaft is geared to sprocket countershaft using heavy roller chain to operate the rolls. The chain drive permits a greater variation in the spread of the rolls, hence a greater variation of finished sizes. Gearing, sprockets and chain are fully enclosed with heavy metal guards — Alemite lubrication is used throughout.

Further details regarding this new roll crusher may be had by writing to Austin-Western Road Machinery Co., of Aurora, Ill.

Double-Roll Crusher Has Safety Spring Release

Announcement was made by McLanahan & Stone Corp., Hollidaysburg, Pa., of an improved double-roll crusher with an adjusting spring release.

The frames of these crushers are of exceptionally heavy construction built of H-beam steel, welded into one rugged, four-sided unit with no bolts or rivets to shear off or loosen. They are equipped with special, interchangeable, patented Macmetal or steel segment shells for different types of crushing. This means that the inexpensive rolls can be easily changed without removing hopper, shaft or bearings.

Tramp iron protection is provided for by compression springs of necessary strength behind each movable roll. Shear pins in the pulley are provided when necessary for special work.

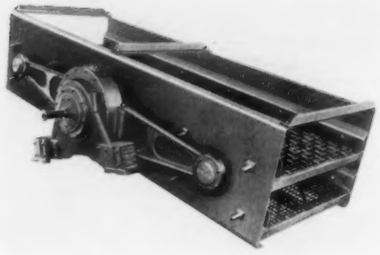
The opening or closing of the rolls for different sized products is made by loosening or tightening the two hexagon nuts on the heavy steel adjusting bolts on each

side of the crusher. The heads of these bolts fit into the slots in the movable, split bearings and extend through the compression springs, spring seats and hollow adjusting screws.

The tension on the rolls is adjusted by loosening or tightening the hollow adjusting screws which pass through the vertical spacers which separate the top of the lower frame from the top channel. This spacer, as well as, the stationary bearing, is held from spreading by steel welded to the top of the channel frame and bottom of the top channel tie bar.

The split bearings of one roll are stationary in the crusher frame, while the heavy split bearings on the movable roll slide in the horizontal guides on each side of the side frame, if uncrushable material gets into the machine. These bearings can be furnished with babbitted or split bronze bushings.

A special heavy-pitch, long-tooth gear of cast iron or steel is located on the end of the roll shaft on the opposite side from the pulley. This gear drives a duplicate on the movable roll shaft. If it is desired to change the adjustment over ¾ inches on this crusher, different sized gears can be furnished when desired. For rolls 30 inches in diameter and over, standard machined hubs are keyed to the shaft and to these are bolted the machine-fit cast iron or steel or cut steel rims for producing different sized products if desired.

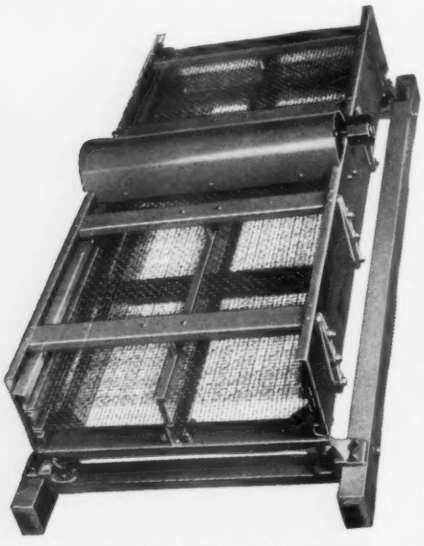


Improved model Jigger screen.

SCREENING . . . WASHING

Double-Deck Screen Unit Produced in Two Sizes

The type MR screen models recently placed on the market by Universal Vibrating Screen Co. have been designed and perfected to meet the demand for a more efficient double-deck screen unit. In the future, the firm's type C, M and F screens will be confined to single-plane screening surfaces.



Universal Type MR vibrating screen.

The new screens are being produced in two sizes and are larger and heavier than screen models built in the past by the Universal company. Through improved design and construction in this new line, a greater degree of vibratory screening efficiency has been attained in double-deck screens. Clearance is provided between and above decks to accommodate very coarse feeds of material.

The design and construction of the type MR screens represented a great deal of engineering and experimental work during the early months of 1934.

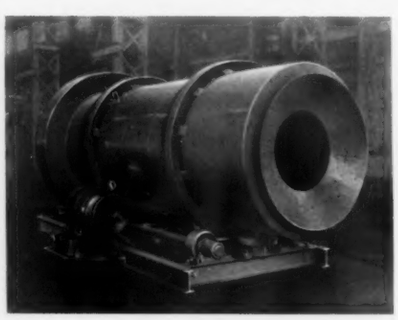
Counter Current Employed in Wet-Type Classifier

A 1934 development of outstanding importance to the industry in general was the perfecting of a classifier of the wet type where abrasive products may be handled with negligible maintenance, or simple and inexpensive replacements readily applied. This device is known as the Hardinge counter-current classifier. As a washing classifier, it has the distinct advantage of the counter-current action of fresh liquid against the flow of incoming feed. In dewatering, the unit is provided with what is essentially an effective dewatering wheel attached to the rotating drum. Where acid solutions or abrasive material is handled, all parts in contact with them are covered with rubber or acid- and abrasion-resistant metal. Flexibility through the variable speed drive permits successful operation during widely changing operating conditions.

The classifier is a slowly rotating drum, on the inner surface of which are located screw flights attached to the drum, revolving with it. The material to be classified is fed in at one end above the pump level and, as the classifier rotates, the coarse particles that settle out are moved forward by the screw flights and are turned over in their forward motion. This action releases any fines mixed with the coarse particles. The fines are washed back toward the overflow end by the wash water introduced at the coarse discharge end, and the fines, with this wash water, overflow through an opening at the feed end of the classifier. The coarse or oversize, in moving to the opposite end, is dewatered and elevated by buckets to a higher elevation so that the classifier may be operated in closed circuit with any suitable type of grinding mill without the use of auxiliary conveyors or other equipment. There is only one moving part in contact with the pulp, and due to the fact that the settled solids are continually being turned over and washed by the counter-current action of the wash water, the efficiency is unusually high. If stopped fully loaded it may again be started without any difficulty. Tramp material, grinding balls or other foreign materials can not cause harm. As the washing action is one of rolling, not scraping, repair costs are next to nothing. The range of fineness will meet all requirements.

Latest Jigger Screen Developments Reviewed

New Jigger screen developments in 1934 by Productive Equipment Corp., Chicago, consisted of a machine operating on SKF spherical self-aligning roller bearings of a size permitting high speeds, the entire vibrator mechanism being fully enclosed and sealed against foreign matter. Self-centering stabilizer arms were developed which eliminate the transmission of any side play from the stabilizers to the vibrator assembly proper. In general, the latest Jigger is a sturdily-built, high-speed, free-moving screen on which can be selected any one of eight different throws most suitable for the material and which can be tilted, even while running, to any desired angle.

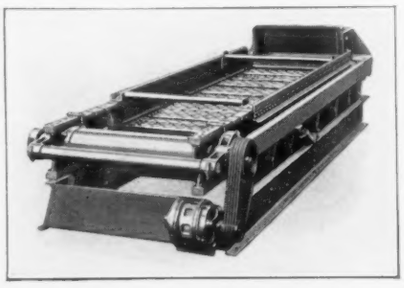


Hardinge counter-current classifier.

Full-Floating Vibrating Screen Is Non-Inclined

The Symons screen, announced late in the year by the Nordberg Manufacturing Co., Milwaukee, Wis., is of full floating design and lies flat. It is not necessary to incline it in order to obtain a movement of material along the deck. This is accomplished because of its unusual action, which is a combination of conveying and screening. The action is such that the material is lifted and actually moved forward a definite distance with each movement of the eccentric and the entire screen area has the same movement.

The screen has a heavy channel base to which are attached two sets of flexible inclined supports; one for the screen deck, the other for the side bars or balance deck which counterbalances the screen deck. The weight of the screen decks is not carried on the bearings but on these supports.



Symons full-floating vibrating screen with motor and drive in foreground.

The screen is actuated from the drive unit located at the discharge end and this too is carried by means of four similar flexible supports, these being placed in a horizontal position. All moving parts are therefore carried on flexible supports, which prevent vibration being carried to building or screen supports. This freedom from vibration is further attained from the counterbalancing effect of the decks, since for each set of forces acting in one direction there is a balancing set acting in the opposite direction. With the screen set flat, less headroom is needed and with no bouncing or cascading of material along the deck close grading is accomplished.

The drive unit is equipped with anti-friction bearings and is enclosed against dust. For screening of hot, dusty materials, this screen lends itself easily to complete enclosure and with the operating mechanism and motor outside of housing and away from the dust and heat. The screen cloth is set in readily removable panels. The cloth is not stretched resulting in longer screen life which is further enhanced due to the fact that the screen cloth in coming in contact with the moving

material is always moving in the same direction that this material is moving. This eliminates abrasive action and unnecessary wear on the screen cloth. A feed hopper is provided which is located on the side bars and vibrates with them, providing an automatic feed which spreads the material evenly over the entire deck area. The screens are built with single, double and triple decks and in lengths up to 20 feet.

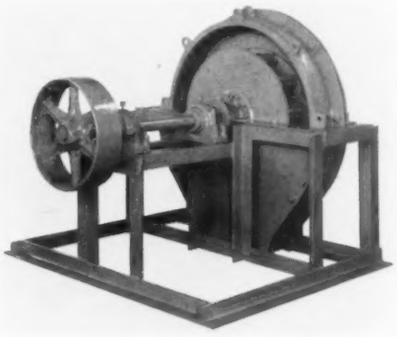
Special Crimping Method Reduces Wear on Screen

The Ludlow-Saylor Wire Co., St. Louis, Mo., perfected an alloy for heavy-duty wire screens and wire cloth for use where severe service is required of vibrating screen sections and revolving screen cylinders. In addition to great hardness and toughness the Super-Loy wires are said to possess a resilience which adds to their wear-resisting properties. A special method of crimping and fabrication is said to eliminate wear between the wires by allowing an increase in the interlocking pressures used to grip the wires together at their intersections.

Softer Materials Taken Out of Aggregates

The Knickerbocker Co., Jackson, Mich., made an important advancement with its soft stone eliminator, a machine for removing soft stone—shale, ochre, sandstone, etc., from gravel. This device is said to enable a gravel that, aside from its natural content of soft stone, is suitable for concrete work, to pass the most rigid specifications. It eliminates the picking belt found in many plants and improves the quality of the product of any pit where soft stone may be found.

The eliminator consists of a rotor revolving in a vertical plane within a suitable casing, the rotor being supported by a heavy shaft revolving in two roller-bearing pillow blocks. The impact bars in the



Knickerbocker soft stone eliminator with side plate removed to show construction.

rotor are made of high-alloy, specially heat-treated steel, to secure properties to withstand successfully the impact and abrasion encountered in operation. The rotor is carefully equilibrated for both static and dynamic balance when assembled, so as to run without vibration at the required speeds. The machine is mounted on an electrically-welded frame fabricated of structural members and is furnished complete with a pulley for lineshaft or motor drive. It is made in one size only with a capacity of from 50 to 90 tons per hour. A 20 hp. motor is said to be ample to operate it at capacity.

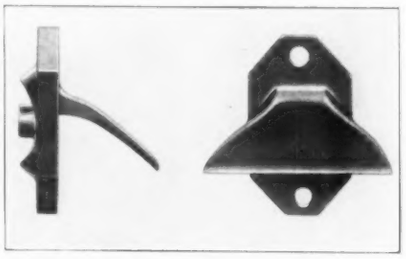
This unit is designed to be set in the production line at a point after the sand has been removed. Stone fed into the machine drops until it reaches the impact bars in the rotor, where it is subjected to repeated blows from these bars until it completes the course around the machine and reaches the discharge opening. Water is introduced at the inlet and the pulverized soft stone runs off at the bottom in the form of fine sand or very small stone particles.

New Wire Cloth Resists Action of Abrasives

The Buffalo Wire Works Co., Buffalo, N. Y., in 1934 announced its new Buff-Aloy high-abrasive-resisting wire cloth which is said to be especially adapted for screening abrasive materials or for hard usage. This cloth is made from a special alloy wire developed by engineers in the company's laboratories.

Screen Nozzle Delivers Flat, Fan-Shaped Spray

The Deister Concentrator Co., Fort Wayne, Ind., has developed the Concenco spray nozzle designed for washing sand and gravel and other materials. The J-132 series of nozzles is furnished with orifices ranging from ⅛-in. to ⅜-in. and delivers a fan-shaped sheet of water. This series is designed to fit a 1-in., 1¼-in., or 1½-in. line. Putting a series of these nozzles on one line creates an unbroken sheet of water which is said to assure effective wash-



Concenco nozzles which deliver fan-shaped spray.

ing. The chief feature claimed for this nozzle is its ease of assembly. An oversize hole is drilled in the spray line and the nozzle attached and tightened up against a rubber gasket which forms the seal between the nozzle and the line. Any slight error which might be made in aligning the holes can be compensated for by adjusting the nozzle.

The Deister Concentrator Co. also made the Deister-Overstrom diagonal-deck sand and gravel washing table which is designed to remove impurities lighter or heavier than the gravel or sand. This table operates on the wet gravity principle and has a driving mechanism which imparts a differential motion to the deck which spreads it out and advances the heavier material along the table.

Perforated Plate Has Square-Round Openings

The Hendrick Mfg. Co., Carbondale, Pa., developed "Sqround Mesh" perforated plate for screens. This new mesh is said to combine the good features of both round and square openings. It is said that it eliminates the oversize which goes through the diagonal dimension of a square mesh because the distance between the fillets in the corners of "Sqround Mesh" is the same as the diameter of an equivalent round mesh. This new mesh is furnished in either flat plates or in double corrugated plate.

Sand Classifier Designed For Variety of Uses

The Kennedy Van Saun Mfg. & Eng. Corp., New York, N. Y., developed a complete new line of washing classifiers and dewaterers which are said to eliminate the shortcomings of the old-type cone entirely. This unit may be used as a single unit, or in battery, or in series to obtain washed and dewatered products of various finenesses. This machine is said to be especially suited to the washing of gravel, concrete, sand, and masonry sand.

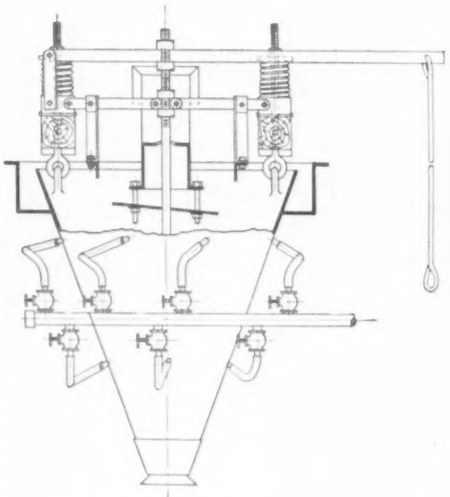
The unit consists of a cone with an arrangement of whirling nozzles placed tangentially around the circumference at definitely determined points. These nozzles add fresh high-pressure water to the interior of the cone, violently rotating the material to be washed. The incoming material is fed into the whirling washing zone of the cone by sending it over a spreader plate, uniformly distributing it around the outside of the cone, and preventing the formation of a vortex in the center of the cone. Dirty water with the dissolved slime and loam is discharged over the whole circumference of the cone edge into a circular launder.

A positive and quick-acting control was built into the machine in order to control classification of the material. The machine is suspended on four springs which continuously weigh the contents of the cone. The movement of the scale beams operated by the spring movement is used as a control medium for opening and closing the discharge gate of the cone. The simple lever mechanism used for this purpose is adjustable so that the material level in the cone can be raised and lowered to suit operating conditions. The adjustability of the material level and of the water velocity spilling over the edge of the cone are said to definitely control the fineness of the product.

Hindered-Settling Type of Funnel Classifier

The Deister Machine Co., Fort Wayne, Ind., developed a compound funnel classifier of the hydraulic hindered-settling type which is said to be particularly adapted to use in sand-and-gravel or other plants for the sizing of fine materials from $^{3}/_{16}$-in. down and also for the cleaning of sand by the elimination of silt, slime, vegetable matter and other similar light impurities.

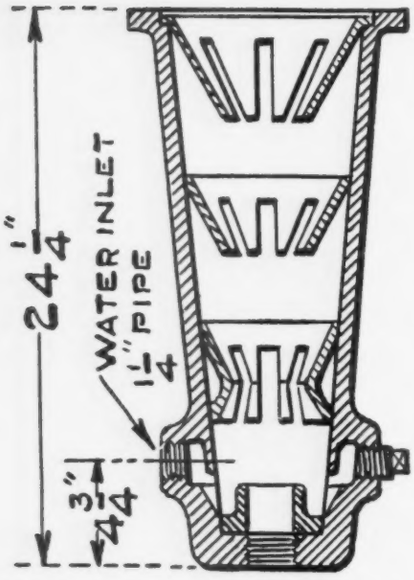
The classifier consists of a conical, open-top barrel in which is placed a combination of three slotted funnels which are held in position by two metal straps and can be inserted in the barrel as a unit.



Kennedy-Van Saun cone-type washing classifier and dewaterer.

The lowermost funnel is of the compound type, that is, its wall inclines inwardly in its upper portion and flares outwardly in its lower portion similar to a venturi tube. In the lower part of the barrel, immediately above the spigot outlet, is a removable flanged casting which has a central opening registering with the opening in the bottom of the barrel. This casting serves as a pressure-water distributor and is also said to prevent the water and sand from cutting out the bottom of the barrel. In the wall of the barrel is an annular hydraulic pressure chamber connecting with the water-inlet pipe and provided with downward sloping ports which direct the pressure water toward the distributor.

There are a number of ways in which this classifier can be applied for particular uses, but the most common is to bolt it to a settling chamber built in, or attached to, a launder or flume. If more than one

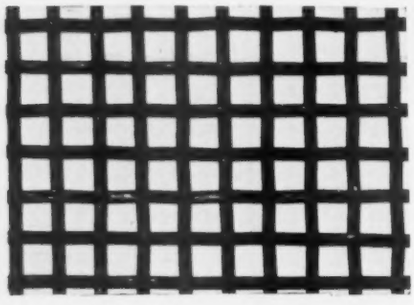


Compound funnel classifier with slotted funnels.

classifier is used settling chambers of various depths are required. Each classifier has a capacity of from 2½ to 5 tons per hr. and requires from 30 to 50 gal. of hydraulic water per min. For best results a fairly constant water pressure is necessary, a minimum head of 40 ft. being adequate in most cases.

Long-Wearing Screen Cloth of Spring Steel

The National Wire Cloth Co., St. Paul, Minn., announced its spring-steel wire cloth for use in crushed-stone, sand-and-gravel, cement, lime and other nonmetallic plants. This cloth is made in sizes ranging from 1/16-in. to 6-in. openings, the spring rods used ranging up to 1 in. in diameter where coarse screening is to be done. This cloth is said to be long wearing and to have a high resistance to abrasion.



National spring-steel wire cloth.

Mobility a Feature of Hydraulic Classifier

The Hydrotator Co., Cleveland, O., began producing a new and improved hydraulic classifier for the classification and washing of sand, gravel and similar materials. A full-sized classifier was hauled on a trailer from Hazelton, Pa., to Lakeland, Fla., a distance of 1,200 mi. in 3 days to demonstrate its mobility. The classifier and trailer weighed about 3,200 lb. This classifier was six feet in diameter but the company states that single units may be built to handle any tonnage.

This classifier is being tried out by various phosphate companies in Florida for the classification of fine phosphate rock. It takes the washer water and fine solids, overflows the water, clay and fine solids through 60, 100, or 150 mesh as desired, and underflows a clean, deslimed sand product, ready for flotation treatment. The company plans to demonstrate this classifier in other territories and industries where classification is practical. The demonstration unit is equipped with a Lincoln electric motor and controls and a Reeves variable-speed drive.

Screens Supplied to Meet Needs of Particular Use

Ever since 1884—more than a half century—F. P. Smith Wire & Iron Works has been manufacturing wire cloth and screens for separating various minerals. These screens are made with uniform mesh or spaces and manufactured from the best grade of wire obtainable for the purpose. Where screens are required to resist extreme abrasion the company is prepared to furnish them from high carbon spring steel, or manganese wire.

Heavy screens can be supplied in sections of exact length and width and as large as is practicable for handling and shipping. The firm is equipped to roll, form or cut screens to irregular shapes and carries a large stock of wire cloth and screens of all specifications in its Chicago warehouse for immediate shipment.

A test Hydrotator classifier mounted at plant.

LOCOMOTIVES . . . TRUCKS

Easton 20-ton duplex Phoenix "Lococar" designed for quarry service.

Self-Powered Electric Quarry Car Developed

Outstanding among the 1934 developments of the Easton Car & Construction Co. in quarry transportation was the duplex Phoenix Lococar. This car, a burden-bearing locomotive, is of 20 cu.yd. capacity. The Lococar is powered to handle one or more trailing cars, each carrying two bodies of the type illustrated, which is mounted on the Lococar itself.

The Lococar has an over-all length of 37 ft., is 11 ft. 2 in. wide and weighs 32½ tons. Auxiliary equipment includes an air compressor at one end of the car for supplying air to standard Westinghouse air-brakes. There is a motor on each axle, controlled by the operator in the cab through conventional trolley-type controls. Current is obtained by a pantagraph from an overhead trolley wire. Bodies are dumped one at a time by an air-operated hoist hook located at the dumping point which, by remote control, engages the lift lug on the side of each body and raises it to the dumping position.

Diesel Locomotive Has Rugged Design Features

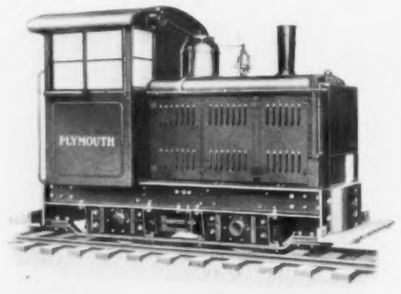
Recently brought out by the Fate-Root-Heath Co. was Model JHD, a 12-ton mechanical-drive Plymouth locomotive, equipped with a Hercules 6-cyl. Diesel engine. The new locomotive is said to combine the ruggedness of Plymouth construction with the high economy and "lugging" ability of Diesel power.

The Model JHD has a tractive force of 10,200 lb. per m.p.h. The wheel base is 63 in. and can be built for any practical gauge of track. Side frames are of rolled cast steel, with bumpers of the same material. Wheels are 24 in. in diameter, with 5⅛-in. axles equipped with Timken bearings.

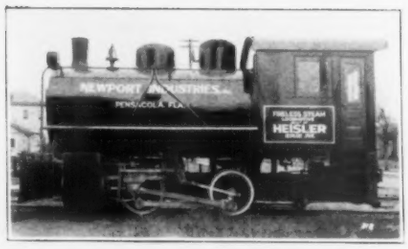
Specifications indicate a draw-bar pull of from 8,000 lb. on a sanded rail at 3 m.p.h. to 1,890 lb. on a dry rail at 16.2 m.p.h.

Steam Locomotive Has No Boiler or Firebox

The Heisler Locomotive Works, Erie, Pa., developed a fireless locomotive, operated by steam but without boiler or firebox. In place of a boiler the engine has



Plymouth 12-ton mechanical-drive Diesel locomotive.



Heisler steam locomotive without boiler or firebox.

a tank of welded construction with a capacity of about three times that of an ordinary locomotive boiler. This tank, which is heavily lagged and jacketed to prevent loss of heat, is filled with water to about four-fifths of capacity. Then, by a steam pipe run from a stationary boiler to a point below the level of the water in the tank, the water is heated until the pressure and temperature in the locomotive tank are the same as in the stationary boiler from which the charge is being taken. It is from this heat stored in the water that the locomotive gets its power.

The energy stored in the locomotive tank in the form of heat is transmitted to the rail in the form of tractive force through the expansion of steam in the large low-pressure cylinders of the locomotive. After charging there is steam in the space above the water in the tank and as this steam is drawn off through the throttle in small quantities, and expanded in the low-pressure cylinders as the locomotive works, the pressure and temperature of the steam remaining above the water in the tank are reduced. During this reduction part of the water is turned into more steam, and this process continues until atmospheric pressure is reached and the temperature is 212 deg. F.

The engine can be charged from any stationary boiler which carries a pressure of 100 lbs. or more. It is said that one charge may last from two to ten hours under normal conditions of service, depending upon the amount of work required of the locomotive. The time required for charging a fireless locomotive depends upon the pressure and horse power of the boiler from which it is being supplied, as well as the size of the locomotive. From 10 to 30 minutes for a full charge is said to be the usual time. Where the stationary boiler carries superheated steam, charging time is considerably reduced.

The water initially put in the locomotive tank never needs replacing, as the steam condensed in charging continually raises the water level. In fact, the engine has to be blown down occasionally to reduce the water to the proper level.

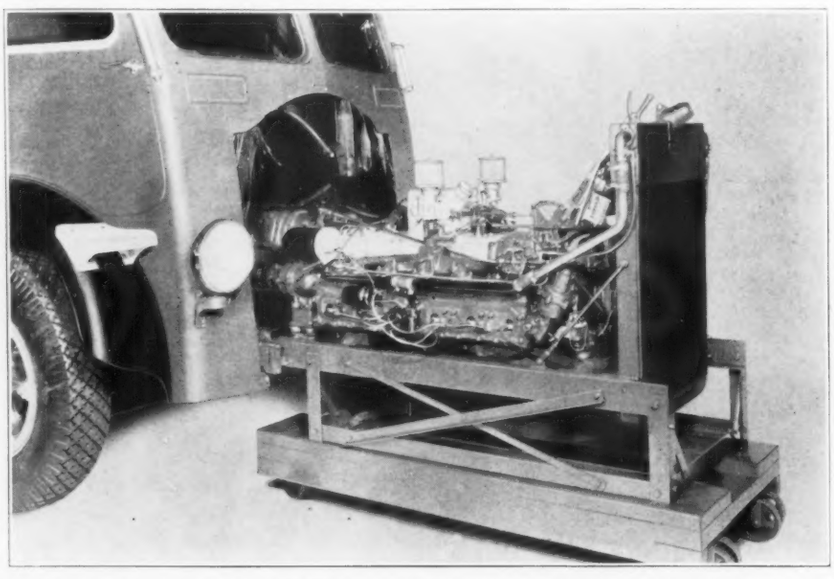
Cab-Over-Engine Design in Mack Motor Truck

Mack Trucks, Inc., New York, N. Y., in 1934 began production on two new Traffic Type trucks of cab-over-engine design. Due to this construction these new models save 3 ft. in length over the corresponding conventional models besides providing one-third front and two-thirds rear distribution of gross weight. Because of this more equitable distribution gross weight within particular axle weight limitations has been increased so that on the same maximum authorized tires the new Model CH, rated at 3 to 5 tons, can carry 1,100 lb. more than its conventional counterpart, while the new CJ, rated at 3½ to 6 tons, will carry 1,200 lb. more. A reduction of 5 ft. in turning radius has also been obtained by this construction.

Both the new models are powered by 6-cyl. engines, that in the CH having a 4 by 5½-in. bore and stroke and developing 106 hp. at a governed speed of 2,300 r.p.m.; while the 4¼ by 5½-in. CJ engine produces 117 hp. at the same speed. Both engines are of the L-head type with offset turbulence-type combustion chambers and block-cast cylinders of heat-treated, chrome nickel alloy semi-steel with a one-piece detachable head of the same material. Valves are of the flat-seat type with the chrome-silicon exhaust valves seating on alloy valve seat inserts. Case-hardened, drop-forged, generator-ground timing gears and full pressure lubrication are other features. Combustion efficiency is enhanced by a thermostatically-operated heat intake vaporizer and by automatic temperature maintenance through a cold-circulation thermostatic cooling control.

Drive from the dry single-plate clutch is taken through the aluminum-housed 5-speed sliding gear transmission which affords four conventional speeds, direct in fourth with an overgeared fifth. Final drive is of the dual-reduction type, the axle shafts being entirely full floating with the entire load being carried by a drop-forged chrome-nickel steel banjo axle. Mechanical foot brakes on all four wheels are actuated by a vacuum booster.

Mack truck, showing cab over engine and dump body of the type used by plant operators.



Shop view of front end of White cab-over-engine truck, showing ease with which engine is removed.

Underslung Power Truck for Heavy-Duty Service

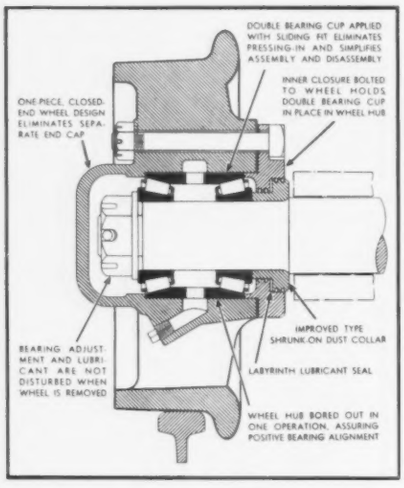
The White Motor Co., Cleveland, O., announced an ultra-modern motor truck with "Underslung Power" for heavy duty service. It is said that these trucks represent an entirely new principle in heavy-duty hauling and that all conventional practices were discarded and new engineering ideas developed to achieve them. Outstanding features of this new truck include: shorter overall length with greater maneuverability; screwed-in Stellite valve seats; interchangeable wet sleeves; dry sump lubrication; full-floating rear axle; silent transmission; unusually wide tread front axle; air brakes; exceptional visibility and other safety features.

The engine is a 12-cyl. horizontally opposed "pancake" type of White design and is essentially a "V" type engine with the angle opened to 180 deg. The engine is placed underneath the floor, with the cab moved forward to the extreme front end of the truck. This power plant arrangement is said to give better weight distribution, lower center of gravity and greater payload space. The valves are on the underside of the engine at the lowest point of the cooling system. The fan is beltless and is driven directly off the end of the crankshaft. The engine is accessible through the floor boards of the cab and can be quickly removed on a dolly.

The new truck is available for all types of hauling, including delivery and dump truck operations. It is available in 24,000 to 30,000 lb. gross-weight trucks and tractor-trailer units and six-wheels for heavier loads. Wheelbases range from 108 to 180 in.

Bearing for Quarry Cars of 2-Cup Design

The Timken Roller Bearing Co., Canton, Ohio, announced a new type of bearing mounting for mine car service. The new mounting uses a double-cup bearing, instead of two single cups. The shrunk-in-place steel dust collar which is a feature of Timken mine car bearing mountings has been retained, but modified so that it provides a labyrinth seal in con-


DOUBLE BEARING CUP APPLIED WITH SLIDING FIT ELIMINATES PRESSING-IN AND SIMPLIFIES ASSEMBLY AND DISASSEMBLY
INNER CLOSURE BOLTED TO WHEEL HOLDS DOUBLE BEARING CUP IN PLACE IN WHEEL HUB
ONE-PIECE, CLOSED-END WHEEL DESIGN ELIMINATES SEPARATE END CAP
IMPROVED TYPE SHRUNK-ON DUST COLLAR
BEARING ADJUSTMENT AND LUBRICANT ARE NOT DISTURBED WHEN WHEEL IS REMOVED
LABYRINTH LUBRICANT SEAL
WHEEL HUB BORED OUT IN ONE OPERATION, ASSURING POSITIVE BEARING ALIGNMENT

New Timken double-cup mine-car roller bearing.

junction with the inner closure. This is said to eliminate the possibility of loss of lubricant or entrance of grit and water.

Outer sealing is insured in the new design by the elimination of separate end caps on the wheels, the unit being cast in one piece, thus effectively preventing loss of lubricant in service or the entrance of foreign matter into the bearing. To remove the new type wheel, all that is required is the loosening of three bolts which clamp the inner closure and wheel in place.

In the new mounting the wheel hub is bored out in a single operation to insure correct bearing alignment. When wheel replacement is necessary, or when it is desired to inspect the bearings the wheel may be slipped off easily without disturbing the bearing adjustment. The bearing remains on the axle as a complete unit, the hub being machined for a slip fit over the bearing cup.

While the new bearing offers many new features, the fundamental advantages of the present mine car application are said to be retained. Both types of mounting provide for inspection and easy adjustment for wear. The bearings in both types distribute radial and thrust loads evenly. Both types are made from Timken special alloy steels and are designed to give long life under heavy loads and severe operating conditions. The new bearing mounting can be furnished in the closed-end wheel, stub and extended-axle types.

Bulldozer for Tractor Weighs Only 1,800 Lb.

The Austin-Western Road Machinery Co., Chicago, Ill., reported production of the new Western No. 35 bulldozer for use with the Cletrac 35 tractor. This unit is said to weigh only 1,800 lb. and to be of simplified construction. It is said to be easy to attach or remove and that the blade and push beams can be removed in a few minutes. The blade can be raised or lowered to any position and held rigidly or it can be allowed to float; the tilt of the blade can also be varied. A gear pump provides positive manipulation, and pressure is applied to the blade in both directions. A lever-operating 4-way valve provides finger-tip control. The heavily-reinforced blade is said to roll the material instead of pushing a dead load ahead, and the high-carbon-steel bit is reversible to provide double wear. Shoes of wear-resisting alloy steel have replaceable soles. It is also said that the adaptability of the tractor is not impaired, turning clearances are not restricted, and the oil pump is mounted out of the way behind the driver's seat in position of power takeoff.

Western bulldozer mounted on Cletrac tractor.

New Medium-Heavy Truck Is Announced by White

A new medium heavy duty truck, adaptable for all general hauling purposes, was announced by The White Motor Co. Designated as Model 718 this new truck combines high load-carrying capacity with a medium-size economical power plant, having a gross rating of 20,000 lb. with a range of wheelbases from that of a tractor of 130 in. up to 190 in.

The engine is a 6-cyl. L-head type with a piston displacement of 303 cu. in., developing 90 horsepower at 2800 r.p.m. The engine crankshaft and camshaft run in seven main bearings. Full pressure filtered lubrication is carried to main, connecting rod, camshaft, and wrist-pin bearings. Five-speed transmissions are available, one fifth direct and one with overspeed, the latter having quiet gears in three speeds.

Davenport industrial locomotive.

Geared Locomotives Have Gas or Diesel Power Units

Davenport Locomotive works, a division of the Davenport Besler Corp., Davenport, Ia., announced a new series of industrial gasoline and Diesel geared locomotives ranging in capacity from 2½ to 25 tons.

The latest, most approved types of power plants are utilized in powering these new Davenports. Particularly noteworthy is the Diesel type of unit which offers the best advantages of the increasingly popular Diesel power.

These locomotives are ideal for a wide variety of services. They are rugged, long lived examples of locomotive craftsmanship, have a wide range of speeds and are capable of maximum hauling power at speeds as low as 2½ to 3 mi. per hr., according to the size of the unit.

The cabs are roomy and comfortable with convenient controls and instrument panels which keep the operator completely informed concerning the operating essentials at all times.

Powerful hand-operated, lever-type brakes are standard on all of the smaller sizes up to 12 tons. On the seven- to 12-ton sizes air brakes are optional. The 15- to 25-ton sizes are equipped with air brakes and auxiliary hand operated brakes of lever type.

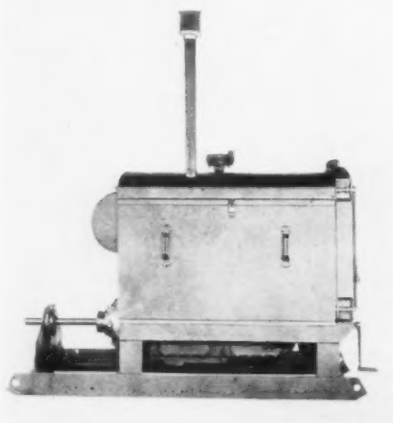
Literature descriptive of this new Davenport series of locomotives in sizes of 2½ to 25 tons is now available with detailed tabulations giving haulage capacities for each at all speeds.

INTERNAL-COMBUSTION ENGINES

Power Units Protected Against Dust and Dirt

An accompanying illustration shows a Model TU climax engine equipped to power rock crushers or screening plants. The units which the Climax Engineering Co. furnish for this service have every protection against the admission of dust and dirt into the carburetor. They are equipped with a sealed crankcase and dust-proof breathers. The air to the carburetor must pass through two air-cleaners. A heavy-duty, oil-bath type cleaner is mounted next to the carburetor. The intake of this cleaner is extended 4 ft. or more above the top of the unit by means of a steel tube on which is mounted an air cleaner of ample capacity. Mounting it above the unit in this manner places it above the heaviest dust, and where it can eliminate the worst particles of dust. The oil-bath cleaner will then have only the fine dust particles to filter out before the air enters the carburetor. This arrangement assures almost pure air entering the carburetor.

The Climax Engineering Co. have furnished units both with and without outboard bearing. When a sharp, flat belt or especially wide belts are used, an outboard bearing is customarily furnished. This construction eliminates heavy shock



Climax unit for powering crushers and screening plants.

loads from the power take-off and assures more economical performance and longer life of the equipment.

The governors on Climax units are specially designed to respond quickly to sudden heavy loads and keep the units running at a steady speed at all times.

Light-Weight Diesels in Wide Power Range

Fairbanks, Morse & Co., Chicago, Ill., developed a light-weight 4-cycle Diesel engine said to provide an adequate capacity-weight ratio. This engine is designed for both marine and mobile equipment as well as for stationary service and is availabel in sizes of 1, 2, 3, 4 and 6 cyl. with capacities of 10, 20, 30, 40 and 60 brake hp. The cylinder size is 4¼ in. by 6 in. and the normal operating speed, 1200 r.p.m.; the displacement is 85 cu.in. per cylinder and 5370 cu.in. per min. per hp. at rated speed. All the engines in the series are of the vertical type with airless injection of fuel.

The cylinders, in the multi-cylinder engines, are cast en-bloc with adequate reinforcing to obtain rigidity and permanent alignment of the crankshaft bearings and cylinder sleeves. The main bearings are embedded in a rigid lower base which is fitted with cover plates to facilitate service and inspection. Removable cylinder liners are employed in all sizes to insure minimum maintenance expense. Cylinder heads are thoroughly water jacketed with carefully-designed passages to insure even cooling and the combustion arrangements are for quiet operation and with clean exhaust over the entire load—and speed range. This construction, together with injection timing control is said to result in easy starting at low temperatures.

Lubrication is force feed throughout, with main bearings, connecting rod bearings, piston pin bearings, camshaft and timing gears as well as the entire clutch and reverse gear in marine engines, supplied with oil under pressure from the main system. The main bearings are large to give low bearing pressures. Intake and exhaust valves are made of a special alloy and are operated by push rods from the camshaft. The single camshaft which is totally enclosed in the engine crankcase is pressure lubricated, also carries the fuel injection cams, one for each cylinder. Cooling water is circulated by a reciprocating plunger-type pump driven from the camshaft at half engine speed. All pump connections are readily accessible from the outside.

Engine Reaches Peak of Power at 2,600 R.P.M.

The Wisconsin Motor Corp., Milwaukee, Wis., brought out a new heavy-duty 4-cyl. air-cooled gasoline engine of 6 to 16 hp. This engine is known as Model "AC4" and has a 2⅝-in. bore and 3¼-in. stroke with a piston displacement of 70.35 cu.in. The peak horsepower is reached at 2600 r.p.m. A feature of this engine is its light weight which was secured by employing light weight materials of high tensile strength in its construction. The engine with accessories is said to weigh only 215 lb. and complete with house, gas tank, etc., only 265 lbs. The overall length of the complete unit is 20¼ in.

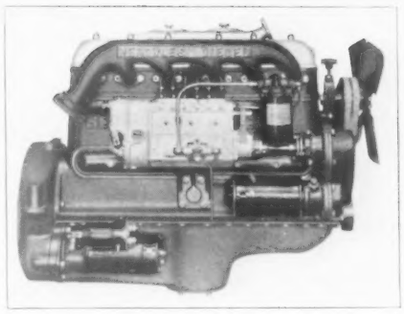
Diesels Interchangeable with Gasoline Engines

The Hercules Motors Corp., Dayton, O., during the year announced an addition to their 6-cyl. Diesel engines, the Model DXRB. This engine has a displacement of 474 cu. in. and an N.A.C.C. rating of 45.9 hp. and develops 120 hp. at 2,000 r.p.m. It interchanges with the Hercules gasoline engines known as the YX and RX series in installation measurements.

This engine is a full Diesel of the auxiliary combustion chamber type which controls the burning of the fuel. Both the crankshaft and camshaft are carried on seven bearings and main and connecting rod bearings are removable steel shells lined with high-lead bronze, capable of carrying high pressures and temperatures. Aluminum alloy pistons are used and connecting rods are of heat-treated chrome nickel molybdenum steel rifle drilled for wrist pin lubrication. Wet type removable sleeves are used for cylinder liners.

Lubrication is forced feed to all main and connecting rod bearings, wrist pins, timing gears and the overhead valve mechanism and the splash from the rod bearings lubricates the cylinder walls. The crankcase and cylinder are cast integral of special iron alloy. As is the usual Hercules practice this engine is also built into complete power units, either fully-enclosed or open types, and can also be converted for marine use.

The Hercules company also added a larger bore model to their "JX" series of 6-cyl. gasoline engines. This engine, the "JXD" has a 320 cu.in. displacement. It develops 83.8 hp. at 2800 r.p.m. and 65.5 hp. at 1800 r.p.m. with maximum torque of 204 ft. lbs. at 1000 r.p.m. (N.A.C.C. Rating 38.4 hp.). A 2½-in. chrome molybdenum crankshaft is supported by seven bearings of the high lead-bronze precision type. The cylinder and crankcase are cast integral of molybdenum alloy iron. The cylinder head is detachable and of "L" head design.



Hercules interchangeable Diesel engine.

POWER TRANSMISSION

New Type V-Belting Is Built Up of Sections

Sectional V-belting with numerous features that recommend it to plant operators has been placed on the market by Manheim Mfg. & Belting Co., Manheim, Pa. Known as Veelos "V" belting, the belt is constructed of units, each consisting of a rubber-impregnated fabric link carrying a metal stud. The belt is built up on the "fish-scale" principle, the units being threaded together in three thicknesses, producing a strong, laminated belt of any length desired.

Features of operation are said to be freedom from slipping, minimum stretch and wear, absolute flexibility, and interchangeability.

The new belt is especially recommended for large speed reductions.

Variable Speed Reducer for Fractional Horsepowers

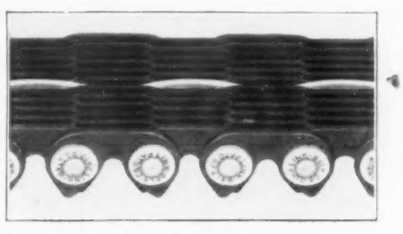
The Link-Belt Co., Chicago, Ill., during 1934 announced the new V. R. D. variable roller drive self-adjusting variable-speed transmission for fractional-horsepower duty as a companion to the P. I. V. gear variable-speed transmission for larger capacities which was brought out five years ago. The new unit is capable of an output of ½ hp. at maximum speed, with a maximum ratio of speed variation of 10 to 1, and continues such features as compact all-metal construction, total inclosure, self-lubrication in an oil bath, protection from moisture and grit, and the use of a positive chain drive.

The chain used for transmitting the power from the input to the output shaft is of the side-contact roller type, consisting of steel links, made endless and connected by hardened-steel pins in hardened-steel bushings.

Openings in each pitch of links provide a pocket for each of two hard-steel rollers, and from both sides a portion of roller protrudes sufficiently to allow each pair of chain rollers, at each engagement of the chain and wheels, to roll into contact with the hardened-steel conical opposed disks forming the driving and driven wheels, until finally the chain is engaged positively in the wedge-shaped wheels at the proper pitch line for the speed desired on the output shaft. The disengagement of chain also is a smooth, rolling action.

A speed indicator allows a ready check-up on operating speed settings to be made. Spring pressure applied to the two disks of one wheel serves to maintain correct tension and compensates for natural chain wear automatically.

The Link-Belt Co., also, announced the improved appearance of the silent-chain drive which it has been manufacturing for the past 32 years by bluing most of the chain and treating the washers and guide bars to give them a silvered appearance. The trade name Silverstreak was adopted. It is made in all standard types, for both industrial first reduction drives and automotive silent timing.



Link-Belt silent-chain drive.

New Cushioning Action in Flexible Coupling

A new flexible coupling which is said to form a simple, positive, yet flexible connection between motor or engine and driven machinery in general industrial service was developed by Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa. Its cushioning action protects both driving and driven equipment against injury from shocks or vibration, and helps to absorb starting or momentary overloads. It also compensates for slight misalignment.

Westinghouse coupling assembly.

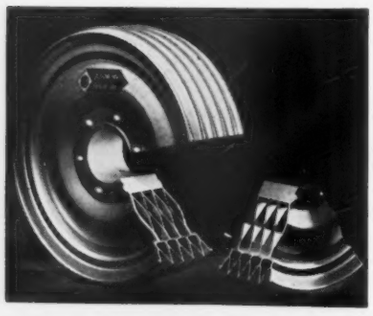
The coupling, Type WH, consists of two identical cast steel flanged halves, two sheet steel cover plates, two snap or retaining rings and from five to twenty-two flexible elements, depending on size. Machined radially around the periphery of each flange are rectangular slots to receive the cushioning and torsionally flexible elements. The torque transmitting element is a rectangular steel plate, and the cushioning elements are made from a high grade hydraulic packing. In assembly, the torque elements are placed in the center of a slot with a cushioning element on each side. Thus the cushioning elements are subjected only to compression under load.

The flexible elements and the periphery of the coupling flanges are provided with a groove, into which snap rings are inserted, preventing radial or lateral movement of the elements. Each coupling half is provided with a smooth steel cover, held securely in place by oval head countersunk machine screws, eliminating projecting parts.

The flexible elements can be removed and replaced without disturbing the coupling flanges, or the driving or driven equipment, by simply disconnecting the cover plates from the flanges, and removing the snap rings. The elements can then be readily taken out and replaced. There being no metal to metal contact of wearing parts, lubrication is unnecessary. Since the coupling is machined all over, it is well balanced, and, it is said, can be used safely for speeds up to 8,000 feet per minute.

Builds Complete Range of Texsteel V-Belt Sheaves

The Allis-Chalmers Mfg. Co., Milwaukee, Wis., announced that Texrope V-belt drives with one or both sheaves Texsteel are now available from ¼ to 15 hp. Tex-



Texsteel grid-type sheave for V-belt drive.

steel sheaves are grid-type construction with accurately-formed heavy-gage steel sections electrically welded at web and rim. Outer rims are rolled for protection, good appearance and strength. Integral bushings or solid-bored hubs are standard. The sheaves have an attractive aluminum finish.

Coupling Also Serves as Automatic Starter

The Falk Corp., Milwaukee, Wis., announced the new 4-Duty Falk-Rawson flexible coupling which starts, couples, cushions and limits the load. The primary function of this coupling is that of an automatic starter, centrifugally operated. The construction involves two drum-shaped members, one attached to the driving member and one to the driven member. Between these members are inserted two sets

Falk-Rawson flexible coupling.

of floating segments, made usually of brake lining reinforced with lead in the right quantities to give the required centrifugal pressure for carrying the load. This coupling is said to eliminate the necessity for the use of oversize, high-torque, or wound-rotor motors in many cases.

It is said that this coupling also fulfills the two important functions of a flexible coupling by providing for moderate shaft misalignment, both parallel and angular, and allows the necessary end float between the two members. In absorbing torsional shock in the drive the shoes act as a slipping clutch connection, taking up the shock by their slippage until the overload is relieved. This unit is made in Types A for direct connection, and B for overhung drives. Spring control can be incorporated to keep the machine from being driven until a predetermined speed of the prime mover is reached. A refractive design combines automatic starting and manual release and another application is as a protective or braking device.

Special Rubber Blocks Provide Flexing Medium

The Morse Chain Co., Ithaca, N. Y., and Detroit, Mich., Division of Borg-Warner Corp., brought out a new and improved flexible coupling, the Morflex, a companion to the Morse standard coupling, using specially-developed rubber as the flexible medium. The flexing member is a complete unit comprising four moulded non-cold-flow rubber trunnion blocks of special design spaced 90 deg. apart and set, under pressure, into a two-piece riveted steel housing. The rubber trunnion blocks are provided with steel cores or bushings also set under pressure into the blocks. The rubber is therefore always under pressure, which condition, it is known, prolongs its life qualities.

Two diametrically opposite blocks are bolted respectively to the armed steel driving and driven flanges which are mounted on the shafts to be connected. Thus all metal parts are rigid and all relative motion confined to the live non-cold-flow rubber. There is no metal contact between the flanges, the only contact between the two shafts is through the flexible rubber bushings or blocks. There is no movement between rubber and metal, all flexing being entirely within the rubber. It is said that shocks and uneven impulses are absorbed and sudden reversal can take place without damage. The Morflex Coupling needs no protection from atmospheric conditions, water, oil, dirt or grit, and requires no lubrication.

Morflex coupling with rubber flexing medium.

COMPRESSED-AIR MACHINERY

Portable Compressor Is Driven by Oil Engine

Ingersoll-Rand Co., recently doubled its line of two-stage, air-cooled portable air compressors. All six sizes are now available with oil-engine drive, as well as with gasoline-engine drive.

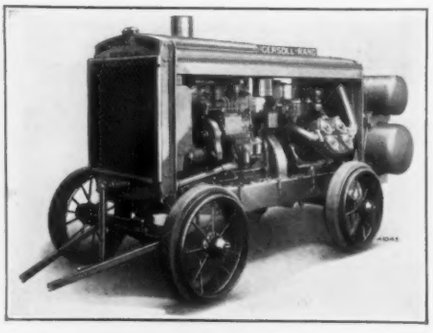
The oil engine known as the "Type H", is a 4-cycle, solid-fuel-injection, spark-ignition engine, that combines the advantage of both the gasoline and the Diesel type of engine. It starts easily with a hand crank and operates smoothly, with invisible exhaust. It has high torque at reduced speeds, giving it the "lugging" ability of a steam engine.

One of the great advantages claimed for the oil-engine drive is the fuel-cost saving resulting from the use of inexpensive non-explosive fuel oils, such as household furnace oil, etc.

The six sizes of the 2-stage, air-cooled portable compressor have respective capacities of 60, 85, 105, 160, 210 and 315 c.f.m. (either gasoline or oil-engine driven—except Model 85, which is gasoline engine driven).

A new type of air compressor which requires no cooling water and which is accordingly particularly adapted to certain applications where water is scarce, costly, or objectionable, has also been developed by Ingersoll-Rand. The machine is called the Motorcompressor and has a built-in motor. The motor rotor is carried on the compressor shaft and the motor frame is bolted directly to the compressor crankcase. This construction eliminates a coupling, as well as motor bearings. A rigid sub-base underneath the entire unit makes a compact machine.

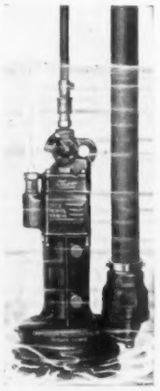
The Motorcompressor is a 2-cyl., 2-stage machine. Cylinders and intercooler are air cooled. Units are built in sizes from 20 to 50 hp., with piston displacements from 113 to 310 cu.ft. per min. and for discharge pressures up to 125 lbs. gauge.



Ingersoll-Rand portable compressor with oil engine drive.

Air-Driven Pump Can Operate Submerged

A new portable, air-operated pump that is said to have a larger capacity at a higher head, has just been put on the market by the Independent Pneumatic Tool Co., Chicago, Ill. No priming is required to start the pump, as it is designed to run partly or fully submerged. Construction is one-piece, forming a self-aligned, compact and sturdy unit.



Thor portable air-operated sump pump showing its installation under water.

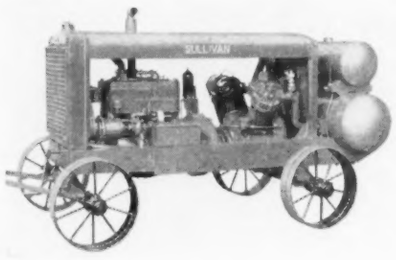
The impeller, being of the closed type, minimizes wear due to sand and abrasive dirt in water, and also increases the capacity of the pump. A variable-speed throttle controls the speed and capacity, and a governor prevents the motor from over-speeding, so that no damage will result when the pump is running free. The

pump is 22 in. in length and weighs 48 lb. It is claimed that 230 gal. will be discharged in one minute at 90 lbs. pressure at 10 ft. of water, while at 70 ft. 100 gal. will be discharged.

Claim Low Fuel Cost on Two-Stage Compressor

The Sullivan Machinery Co., Chicago, Ill., announces its new Type WK60 portable air compressor. This compressor is a two-stage design of the angle or "V" type with the air end air cooled. This is said to reduce fuel consumption which is also decreased by a new Wafer valve of large port area and low lift. The base is welded structural steel and the main bearings are ball bearings.

The power plant is the regular line of heavy-duty industrial type engine used in previous models. Accessories include air



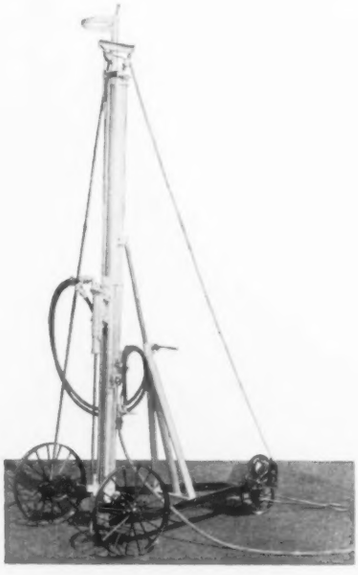
Sullivan portable air compressor.

cleaners, oil filters, etc. The Type WK60 portable air compressor is made in the four sizes for which the company has had the greatest demand and may be obtained in any kind of mounting.

Gardner-Denver Makes Advances in Design

The Gardner-Denver Co., Quincy, Ill., announced a new line of portable compressors. These units are powered with the Caterpillar Diesel engine and are said to show considerable saving in fuel cost over similar units operated by gasoline engines.

The D-1100 Caterpillar engine develops 104 hp. at 870 r.p.m. with a piston displacement of 1039 cu.in. The unit has a wheelbase of 170 in. and weighs 12,625 lb. fully equipped.



Cleveland wagon drill that has proved to be a most versatile machine.

A series of vertical units were also brought out by Gardner-Denver in 1934. Among the advantages claimed for these units over previous models are lower maintenance costs, lower installation costs and savings in floor space. Inlet and discharge valves are cushioned, extra large water jackets completely surround the cylinders and valves, and a water-cooled intercooler is said to save power and increase volumetric efficiency by cooling air between stages.

The crankshafts are large diameter forged steel supported by three bronze-backed, babbitt-lined, full-circle main bearings. All bearings are pressure lubricated through drilled passages and a rotary oil pump assures constant and uniform oil pressure.

Special Hole Blower on Automatic Wagon Drill

The Cleveland Rock Drill Co., Cleveland, O., announced its new Model "WD" universal and automatic wagon drill which will drill holes in any direction and has automatic air feed. When feeding into the rock it is said that the mechanism automatically maintains the drilling machine at the right position for fastest cutting. When reversing or approaching the rock the speed of feeding may be varied from a few inches to 25 ft. or more per second. For ordinary rates of feed it is said that only 4 cu.ft. of air per minute are required for the feeding mechanism.

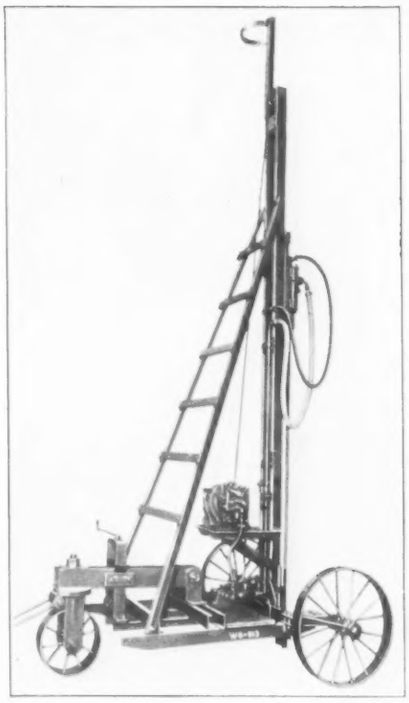
The air feed cylinder serves as a boom or support for the guideways on which the slab-back mounted machine travels when being fed into or reversed away from the rock. The boom is mounted on an offset "U-bar" which can be fixed in any position around the center line of the wheel axle. It is this arrangement which permits of drilling holes at an infinite variety of positions and angles.

The drilling machine is provided with a special blower. A slight pull on the blowing valve suddenly turns full pressure through a ¾-in. hole into the chuck chamber at the end of the shaft, automatically short stroking the hammer and blowing the hole. This hole blowing feature can be incorporated in a wet or dry drill.

Adds Deep-Hole Drill to Extensive Line

The Worthington Pump & Machinery Corp., Harrison, N. J., has recently announced the addition of an improved type wagon drill for drilling deep holes in quarries and general rock excavation to its extensive line of rock drills.

The new machine incorporates an ad-



Worthington rig for drilling deep holes.

justable drill steel centralizer which greatly reduces the time and labor necessary in collaring the drill holes. Another feature is the leveling device permitting the adjustment of the drill tower to the vertical position when the rig is set on uneven ground, thus eliminating blocking up of the wheels. Worthy of note is the fact that the drilling engine can be readily demounted from its detachable feed slide and the slab back guide by the removal of two bolts, in no way disturbing the slab back. The machine can be furnished with either an air hoist or a hand winch for raising or lowering the drilling engine and either a hand winch or block and fall for handling the drill steel.

While the standard type is built with three wheels, it can also be furnished with four, for running on transverse track. The three or four wheeled machine is constructed to be converted to skid type if desired. The drilling engine can be furnished for either light or heavy, wet or dry drilling.

BITUMINIZING AND AGGREGATE PLANTS

Tower-Type Bituminizing Plant a Complete Unit

The new tower type plant manufactured by Hetherington & Berner Inc., Indianapolis, Ind., shown in the accompanying illustration is offered in various capacities, with mixers up to 4,000 lb. This plant is equipped with a reciprocating feeder which automatically feeds the material into the cold sand elevator. The material then passes through the internal oil-fired drier, which can be used for making either hot or cold mixes. The hot sand elevator is of the hinged type and remains intact while in transit. The material then goes through a special 3 or 4-deck vibrating screen for classification and then into a compartment storage bin which is mounted on hinged trunnions and drops forward over the mixer platform for shipment.

The plant is equipped with 4-point suspension dial scales from which the aggregate weigh box and A. C. weigh bucket are suspended. The A. C. weigh bucket is the bottom-discharge type and is steam jacketed to meet present day specifications. The mixer is of the twin-shaft pugmill type, steam jacketed and steam operated, and is equipped with blades with removable tips which are adjustable and reversible.

The mixer platform on which the mixer is mounted and the transmission parts remain intact when moving the plant. The plant is readily assembled and disassembled and can be shipped on a railway flat car or hauled by trucks. The plant is also equipped with a special lime-dust-handling unit which also has a hinged type elevator for feeding the lime-dust hopper and is equipped with a screw conveyor to feed the lime dust into the weigh box.

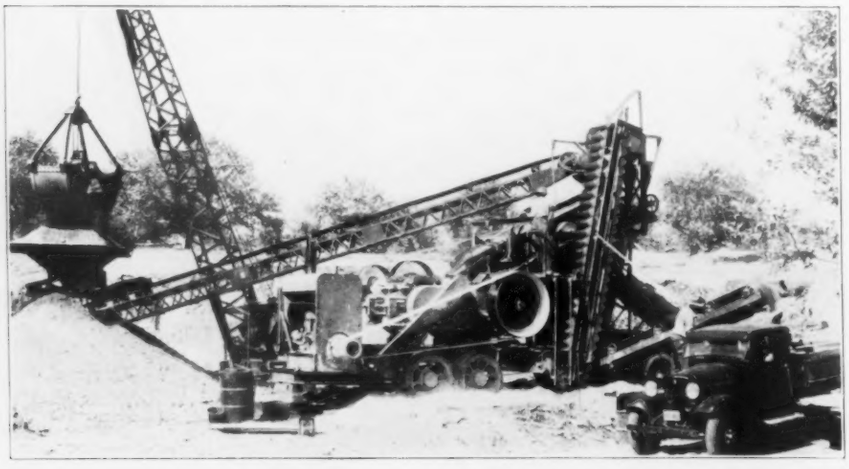
Portable Gravel Plant Has Novel Screen Layout

The Pioneer Gravel Equipment Co., Minneapolis, Minn., has developed the Pioneer Vibrator Duplex plant for crushing and screening sand and gravel. An interesting feature of this plant is the use of a blank plate between the two screening decks of the vibrating screen to provide two specification screen decks. In operation the pit-run material is fed to the

Hetherington & Berner tower-type aggregate-bituminizing plant.

lower deck with the returns from the bucket line coming to the top deck. The material rejected by the top deck is fed to a roll-crusher, the material on the lower deck going to a jaw crusher. The material passing the upper deck is by-passed into the mixing hopper of the plant and, due to the blank plate, need not again pass the lower deck. This system is said to give absolute control from the operators' platform of the balance of the load between the two crushers. If the primary crusher is overloaded on account of the roll-crusher not doing enough work, a ratchet lever on the jaw crusher allows opening the jaws so that part of the excess load can be diverted to the roll-crusher. A plant of this type, recently purchased by the West Michigan Construction Co., Holland, Mich., is said to be producing an average of 45 cu.yd. per hr. based on 30 per cent. pit-run oversize material and is rejecting about 30 per cent. excess fines. This plant is equipped with a swivel-type feed conveyor.

All Pioneer plants are equipped with the sand-rejection feature. Also standard equipment is the SKF roller-bearing crusher. Option is given on the bronze-bearing roll-crushers in four different sizes.



Pioneer portable sand-and-gravel crushing-and-screening plant.

OTHER EQUIPMENT

Classifier Scalps Out Heavier Dust in Gases

Probably the most important 1934 development of Western Precipitation Co. was a piece of equipment known as an Impact Classifier. This is finding application in conjunction with Western Precipitation Co.'s multiclone equipment and is used for the purpose of scalping out of the gas stream, the heavy dust or rather large particles before the fine dust is collected in the multiclone.

One of the 1934 installations of this equipment was in the Watertown, N. Y., plant of the General Crushed Stone Co., illustrated here. In this instance, the classifier was installed on a rotary drier, drying crushed limestone. The coarse material in this case is returned to the hot-material elevator.

Wire-Rope Sockets Prove Stronger Than Rope Itself

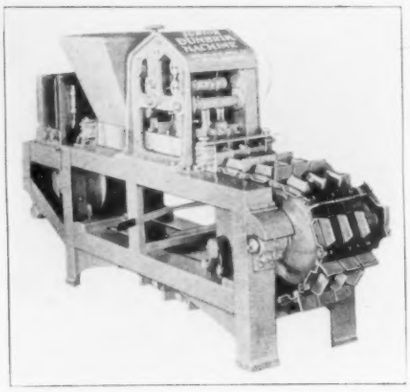
Going into its twenty-fifth year of manufacture and use in the pit and quarry industries the Evanssteel Wire Rope Socket has an enviable record of never having had a known failure, the maker claims.

A recent test was made on this socket with a 1½-in. wire rope. With 81 tons pull the rope gave out but the sockets were not damaged in any way.

The sockets are made by Chicago Steel Foundry Co. of Chicago, Ill., which also makes kiln ends for the lime industry, and many types of heat-resisting steel castings for the cement industry.

Continuous Production on Brick-Making Machine

The W. E. Dunn Mfg. Co., Holland, Mich., developed a new automatic, straight-line, continuous-production type of brick machine in which the pallet boxes pass under an open-bottom hopper where the material is measured and then passed under a graduated packer-head from where



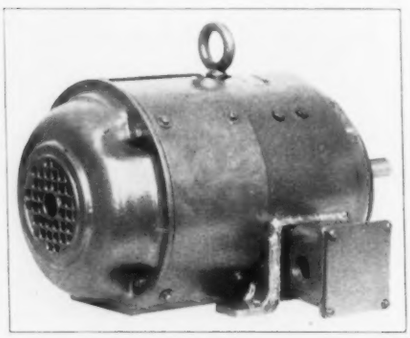
Automatic Dunbrick machine which makes bricks with voids in mortar bed.

the finished bricks are delivered by an endless carrier to an off-bearer. The machine has a capacity of 25 U. S. standard bricks per min. and can be readily converted to make either double or triple brick as well. A void in the under mortar bed reduces the weight about a pound below that of ordinary bricks and is said to require 20 per cent. less material. The "Dunbrik" machine is also made in larger sizes with capacities up to 24,000 units per day. In addition to the standard brick units the machine can be furnished to make building tile in sizes ranging from 5 in. by 4 in. by 8 in. to 5 in. by 8 in. by 12 in.

Dustproof Motor Line Has Dual Ventilation

A new line of direct-current motors, designed for those applications where dust, dirt, moisture, or other foreign matter is present in large quantities, was introduced during 1934 by the General Electric Co., Schenectady, N. Y. The new motors, totally enclosed and fan-cooled, are available in a wide variety of electrical and mechanical modifications, in sizes from ½ to 200 hp.

A system of dual ventilation is utilized. This, together with water-tight conduit



Inclosed G.E. fan-cooled direct-current motor designed for severe conditions.

box, and labyrinth seals at the cartridge-type bearing housing effectively protects the working parts of the motor. An internal fan draws the warm air from the windings and core and circulates it around the totally enclosed interior of the motor so that it gives up its heat to the frame and end shields. An external fan draws cool air in through mesh openings in an outer end shield and directs it over the surface of the magnet frame and inner end shields. Close clearances between the end shields and the bearing housing, and grease seals along the shaft, prevent foreign particles from entering the motor.

These new direct-current motors are said to be especially suited for application in locations where obnoxious process-dusts prevail, and to such apparatus as stokers, conveyors, pumps, machine tools, sand screens and shakers. They are suitable, too, for outdoor use in mild climates.

In addition to total enclosure, these fan-cooled motors are said to offer, as compared with totally-enclosed motors, a saving in space, greater output per pound of material, economy of operation, and interchangeability with most open motors of corresponding ratings.

Self-Propelling Paver for Black-Top Construction

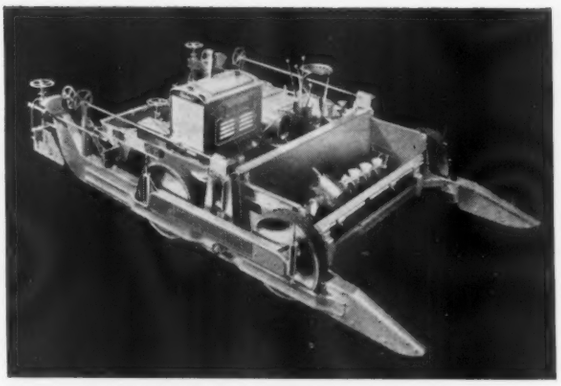
Announcement of its latest 1935 model black-top self-propelling road builder, made by The Jaeger Machine Co., Columbus, O., states that it makes possible bituminous pavements having smooth, fine riding qualities, without the use of road forms. The machine is telescopic and adjustable for 9 to 15-ft. widths and handles 400 to 1,000 tons of material per day.

Material is received in the hopper from dump trucks. The paver pushes this material forward and the spreader screw distributes the material. Instead of the usual road forms, the machine itself has 18 ft. straight edge runners which are really movable forms. They are full floating and carry the screed only, all other weight of the machine and road material being supported by the four rubber tired wheels. The runners smooth out the subgrade and, since runners and screed float, wheels dropping into holes or irregularities encountered in the subgrade in no way affect the finish of the road.

No weight or traction is transmitted to the new road surface, since the runners and wheels operate on the old road or subgrade, only the screed and blender screeds at rear touching the newly laid material. The rubber tired wheels, operating on firm ground, will take machine with loaded hopper up any grade with no spinning of wheels or tearing of the grade—an important advantage. Runners can be lifted in two seconds, by power, for maneuvering on the job.

The screed is the standard Jaeger-Lakewood oscillating type with saw-toothed front edge, tiltable for compaction, and can be set for any specified crown and thickness of spread of from one to 6 in. If necessary, it can run to any grade wire or marker or can be operated with one end below runners, the other 7-in. above runners, on a leveling course. The power-driven screw and heater help to break up lumps in the material, and a reversible screw allows the operator to spread material where desired.

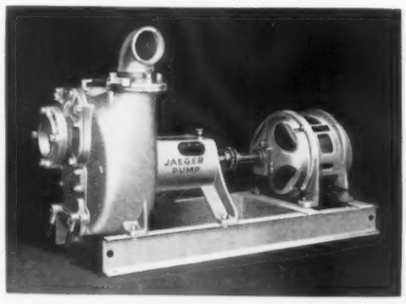
A telescopic frame permits width adjustments from less than 9 ft. to 15 ft. Blender screeds, at the rear of both runners, adjust laterally for spreading bled back material any additional width up to 12 in. on either side. The ability of the machine to lay a 15 ft. strip makes possible the paving of a 30 ft. road in two sections with only one joint—a real saving.



Jaeger self-propelling black-top paving machine.

The machine has automotive construction throughout, a 32 h.p. engine, heat-treated gears running in oil, built-in differential for easy steering, banked controls and variable speeds forward of 12 to 25 ft. per minute, and up to 120 ft. per minute in reverse.

Another Jaeger development was its line of "Sure Prime" Centrifugal Pumps. This type of pump was designed to provide the enormous water capacity and high efficiency of the centrifugal pump with the further advantage of quick, completely automatic self-priming at lifts even above 25 ft. On drainage work it is possible to handle any volume from seepage up to 125,000 gallons an hour. On water supply work, such as sand and gravel washing, these pumps are able to deliver huge volumes in relation to their size, at correspondingly low cost.



The "Sure-Prime" centrifugal pump.

Designed with only one moving part, the impeller, which is carried on Timken or ball bearings. All castings are 20 per cent. steel, wear resisting. The pump is furnished with either gas or electric drive, on stationary base or portable 2 and 4-wheel trucks. Capacities, conservatively rated, are: 2-in. size, 10,000 g.p.h.; 3-in. size, 20,000 g.p.h.; 4-in. size, 40,000 g.p.h.; 6-in. size, 90,000 g.p.h.; 8-in. size, 125,000 g.p.h.

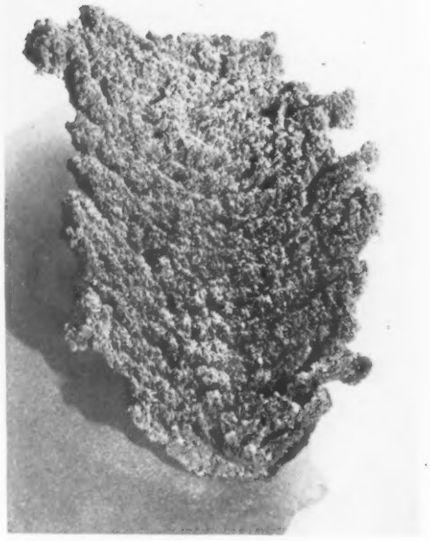
Chemical Treatment of Coal Improves Burning

Various methods have been used in recent years by the cement industry to improve burning conditions and lower fuel costs. Pulverizing the coal has helped, as have improved fuel-injection methods, preheating the air, and utilizing waste heat. The latest method and one which is attracting considerable interest involves the chemical treatment of the coal used in firing the kilns. This process was announced by the Technical Sales Corp., 1010 Euclid Ave., Cleveland, O. Its product, called Procite-Treated Technicoal, is a low-ash, high-heat-value coal that has been technically prepared to make it an excellent fuel for modern high-rating combustion use. This coal has been successfully used for modern boilers, cement burning, gas producers, etc.

Technicoal has an inherent ash content of 6 per cent. and a specific gravity of 1.45, and is sold with a guarantee that it will not vary by 1 per cent. from a guaranteed analysis. This coal is first cleaned by the Chance flotation process which removes not only all the impurities but also all the coal having more than 6 per cent. inherent ash. As the coal leaves the cone cleaner it is automatically sprayed and impregnated with a solution of Procite. This is a chemical treatment, permanently affixed to Technicoal and unaffected by weather conditions and is said to eliminate all the objectionable features hitherto found in coals of moderate sulphur content.

It is claimed that Procite conditioning does not add to the heat value of Technicoal, raise the fusion temperature of its ash, or lower the sulphur content, but it does effect the complete removal of the sulphur during combustion at all temperatures in excess of 1,000 deg. F. Due to the removal of the sulphur, the iron in the ash (with which the sulphur is always found as ferrous sulphide—melting point 2,140 deg. F.) is changed to ferric oxide (melting point 2,800 deg. F.).

This change in the form of the iron results in porous, friable and free-moving ash, in place of the customary heavy metallic consolidated clinker. The removal of the sulphur changes the clinker characteristics from a fused acid mass to a neutral silica-iron-lime slag which will not adhere to the metallic grate surfaces or to the refractory furnace linings. Such clinkers as are formed are easily broken by movement in the fire-bed, either mechanically or by hand, and are easily removed by any of the conventional dumping devices used with modern furnaces.



Porous, friable and free-moving ash resulting from Technicoal.

"Procite-conditioned coals," according to F. H. Westlake, Jr., the company's engineer, "have proved very valuable for the manufacture of Portland cements because of the fact that they are high in iron and sulphur compounds. Complete elimination of the sulphur during combustion, effected by the Procite treatment, leaves the entire iron content of the ash free to flux with the cement-making materials at an early temperature. This complete early fluxing of the iron in the coal ash has enabled Procite-conditioned coals to effect the fol-

lowing changes and economies in the manufacture of Portland cement:

(1) Lower coal consumption; (2) increased kiln production; (3) more uniform operating conditions; (4) prevention of kiln-ring formations; (5) lower sulphur content of the cement clinker; (6) improved finished neat cement color; (7) increased uniformity of the cement clinker; (8) increased tensile strength of the finished neat cement; (9) increased grindability of the cement clinker; and (10) a controlled calcining zone from improved flame characteristics.

Dust Helmet Designed for Wide Vision Range

The W. W. Sly Manufacturing Co., Cleveland, O., in developing its air helmet has produced an article which is said to combine unusual comfort with wide range of vision. The helmet, which weighs only 5 lb., has an adjustable sweat band and fits the head like a cap. The head rest is padded with soft sponge rubber and part of the weight is carried on the wearer's shoulders, chest and back. The air entering the helmet passes through a filter and purifier. One section of the purifier acts as a water and oil separator with a drain cock at the bottom and the other is a renewable cartridge which prevents, by the use of gauze and charcoal, the entrance of vapor, fumes, odors, and finely divided solid matter.

Large Bonnet Hex in New Bronze Gate Valve

The Kennedy Valve Manufacturing Co., Elmira, N. Y., placed on the market a new heavy standard bronze gate valve designed for 150 lb. working steam pressure and 250 lb. working water, oil or gas pressure. This valve, known as Fig. 23, has all the special features of design which were recently incorporated in the Kennedy Fig. 27 standard bronze gate valve but is heavier throughout to withstand the higher working pressures for which it is intended.

One of the outstanding features of these new valves is the large bonnet hex which is placed close to the body to make the entire valve more rigid and also to assist easier removal of the bonnet and stem assembly when the valve is installed with close clearances. Another important feature is the design of the stem which is made of specially tough bronze, has an unusually large number of heavy contact threads, and has a flexible connection between the stem head and the disc, making stripping of threads almost impossible and thereby prolonging the life of the valve.

Cemented Closures for Paper-Lined Cloth Bags

A 1934 development of The Bemis Bro. Bag Co., St. Louis, Mo., was a new closure for the sealing of paper-lined cloth bags which employs a cemented strip applied by machine over the open end of the bag. The cement is entirely waterproof and sets instantly. Easy opening and easy handling of the bags are said to be features of the new method. This machine, it is said, will seal from four to six bags per minute.

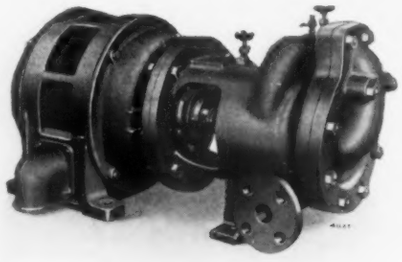
Pump Rotor and Motor Mounted on Same Shaft

The Cameron Motorpump made by the Ingersoll-Rand Co., Phillipsburg, N. J., is now built in 26 sizes ranging from ¼ to 30 hp. and in capacities from 5 to 1,000 gal. per min. Certain sizes are 2-stage units and some other sizes are fitted with self-priming attachments which make them suitable for sump or gathering pumps. Each Motorpump is a complete pumping unit with a built-in electric motor and pump rotor on the same shaft. Wearing rings, shaft sleeve and ball bearings are readily removable. The rotor is of the solid type and is practically indestructible. The impeller is cast in one piece of bronze and is hydraulically balanced. Stationary renewable wearing rings seat impeller hubs against leakage. The stuffing box has needle valve control and ample space and a split gland make repacking easy. Removal of the suction nozzle piece gives complete access to the impeller. Equally-spaced studs on the pump casing permit the discharge to be set in any one of four positions.

Fuller Presents Weighing Feeder by Dr. Grunewald

The Fuller Co., Catasauqua, Pa., was granted the exclusive license for the manufacture of a new weighing feeder, by the inventor, Dr. Max E. Grunewald, of the Coplay Cement Manufacturing Co. during the past year. This feeder is intended to handle practically all dry pulverized materials, and is of especial interest to the cement industry, as a feeder for both pulverized coal and dry cement raw materials. The first installation is feeding dry cement raw material to a kiln, and is said to have shown amazing accuracy by weight.

Among the features of the new feeder are its ability to feed a uniform stream of predetermined weight continuously, the weight of the stream being variable at will by remote control, as from the burning platform of the kiln. The weight of the stream is thus automatically made adjustable within all normal limits, without adjusting the scale equipment. As the feeder delivers material by weight rather than by volume, materials which



Cameron single-shaft motor and pump.

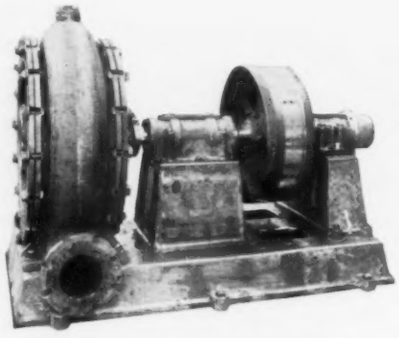
vary in weight due to bulking or absorption of air do not impair the accuracy of the apparatus.

The feeder incorporates a Fuller automatic weighing batcher of the type furnished to contractors and cement mills for weighing Portland cement. This batcher operates automatically, and is discharged at any desired interval, the rate of discharge being subject to remote control, so that the stream ultimately discharged can be varied in weight to suit the will of the operator. The batch is discharged into a scale pan, which carries the reserve supply. A Fuller rotary feeder of the self-cleaning type withdraws a continuous stream from the scale pan. This feeder is driven by a variable-speed motor, so controlled that if the weight of the material withdrawn during any interval of batching varies from the weight of the batch, the weight of the stream is automatically compensated during successive intervals until the weights are exactly uniform. This automatically corrects all variations in the weight of the material per unit of volume due to any cause; and also allows prompt variation to be made in the weight of the stream by remote control merely by changing the rate at which the batcher discharges into the scale pan.

Extremes of weight can be established by changing the scale setting of the batcher, but this is unnecessary in the feeding of raw material, for instance, as the original setting will allow sufficient variation for all purposes to be made. A counter, whereby the actual weight of material for any given period can be established, is provided.

Joint Wear Eliminated in New Dredging Pump

The general features, relative to design, of a dredge pump, which forms the most important unit of a hydraulic sand and gravel plant, are well known to sand and gravel producers, but the "Wear Resister" incorporated in the new "Diamond" pump is, according to its manufacturer, the Pettibone Mulliken Co., Chicago, Ill., as yet not generally known. In a dredge pump, when the joints between the shell and the sideplate castings are not sufficiently tight to prevent entry of water carrying sand and other abrasive materials, which remain in these joints setting up an abrading or wearing action on these parts, this undesirable abrading or wearing action causes such impairment to these parts as to render the dredge pump inoperative. The "Wear Resister" is said to totally eliminate this wear at these vital joints, resulting in longer life to the pump, greater sand and gravel production, less shutdown periods, and consequently, a lower cost of production.



Pettibone-Milliken Diamond dredge pump.

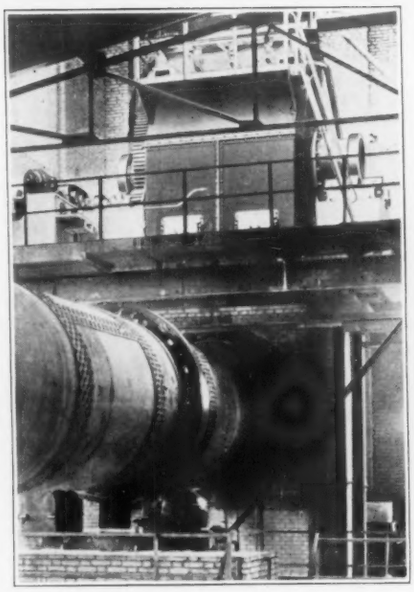
The construction of the "Diamond" dredge pump equipped with the "Wear Resister" is such that a rubber ring is compressed into the opening between the shell and the sideplates by inwardly tapering surfaces. The greater distance the side plate is moved inward toward the impeller, the more the rubber is compressed. This is said to be particularly desirable since the "Diamond" pump is designed so that the suction side plate can be moved inward toward the impeller to take up wear on the suction side plate and impeller to prevent internal leakage.

Machine Reduces Fuel Consumption of Kilns

The so-called "Calcinator" of the Miag Muhlenbau u. Industrie A.-G., Braunschweig, Germany, introduced for the reduction of fuel consumption on rotary kilns in the cement industry, has found remarkable success in this country. About seventy-five of these machines are now in successful operation.

The principle of this machine consists of the intensive use of the heat contained in the exit gases of the kiln for the drying of the slurry in wet process, and for preheating the raw material in dry process. These processes are taken out of the kiln and performed in the Calcinator by creating in it a very large surface with a large number of filling bodies, while the outside surface of the machine is a very small one.

The Calcinator is installed over the feed end of the kiln, and consists mainly of a slowly rotating drum of about 10 ft. to 13 ft. in diameter and 5 ft. to 10 ft. in width. Instead of a solid shell this drum consists of a circular grate with bars forming openings, spaced about 3 in. apart. This circular grate permits free entrance of the slurry or raw material from the top and discharges it through the lower portion of the drum, and at the same time allows the hot gases to pass through the drum from the bottom in counter-current.



The Miag slurry drier in position above the feed end of the kiln.

The drum is filled to about one-half of its volume with so-called filling bodies, large enough so that they can not fall through the spaces between the bars, and having the purpose of providing a very large surface to the raw material and to the gases according to the before mentioned principal idea of the new machine. These filling bodies are pieces of pipe about 5 in. in diameter and 5 in. long. The drum is encased by a sturdy steel housing, which, in its lower part where the hot gases enter, is lined with refractory bricks. The drum has a very slow rotation of about 1 r.p.m., and is supported by two trunnion bearings with automatic oil lubrication. Other parts of the installation are the connecting chutes under the Calcinator, connected with the kiln by a sealing device, and a fan with the necessary piping for the hot gases.

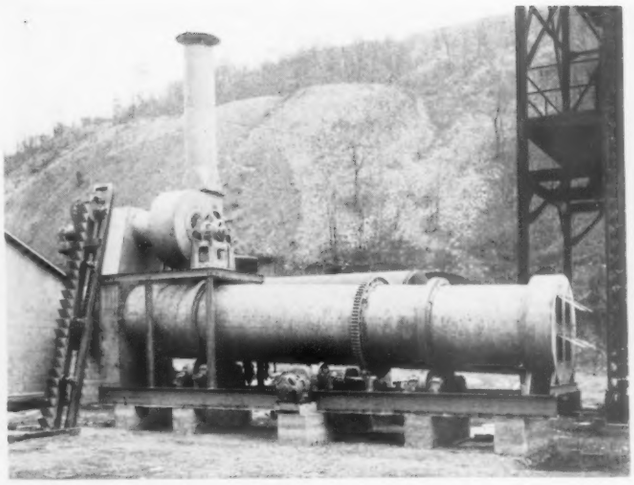
In the operation of this machine the raw slurry is pumped to a compensation feed bin over the Calcinator, from which a series of nozzles feed the slurry into the slits between the bars of the rotating drum. The bin has an overflow so that the level of the slurry is always maintained. If for any reason a change in the rate of feed is desired, this can be obtained by the use of different sized nozzles.

A bucket wheel feeder can also be used as its speed may be observed and regulated by the kiln operation. The slurry entering the drum spreads itself very quickly over the slowly moving filling bodies, which are more or less covered by the slurry. The hot gases coming up from the kiln pass through the many always-changing channels of the filling bodies and perform a quick drying of the slurry. This slurry leaves the Calcinator in the form of small nodules.

The operation of the machine is simple as it consists mainly only of the observation of the temperature of the exit gases leaving the Calcinator, and maintaining them between 200 deg. and 210 deg. F. by adjusting the slurry feed. Working in this way the best operating conditions and the lowest possible fuel consumption are possible, the nodules leaving the Calcinator with only about 5 to 10 per cent. moisture content.

Combined Drier-Cooler Internally Oil-Fired

A combined drier and cooler for limestone was recently brought out by McLanahan & Stone Corp., Hollidaysburg, Pa. The outfit is oil-fired internally and the accompanying illustration gives an idea of how it appears in service.



McLanahan & Stone internally-fired drier and cooler for limestone.

The outside drier cylinder is built of rolled steel with butt-welded joints. Around the outside, and fastened to this cylinder, are two heavy, weldless rolled steel tires. Each tire revolves on two of the four trunnion rollers which are keyed and set screwed to short shafts which run in split, bronze-bushed angle bearings which are supported on the sole plates. These trunnions are adjustable so that the cylinder may be maintained in proper alignment. The sole plates are mounted on cross members which are welded to, and a part of, the heavy welded structural steel supporting frame.

Lateral movement of the drier shell is controlled by two horizontal thrust wheels, mounted on vertical shafts, which rotate against each side of the drum tire at the low end of the cylinder.

The receiving end of the outside shell of the drier fits neatly into the welded steel hood which received the waste gases. The opening around the cylinder is sealed by adjustable, cast-iron segment plates. On the side of this hood is a cleanout door and at the bottom of the hood is a steel hopper with a drop door through which accumulated dust may be removed.

The suction side of the exhaust fan is connected near the top of the hood. The gases and dust are lifted by the fan and discharged through the stack while the heavier particles drop into the bottom of the hood hopper where they may be removed as explained above.

A welded-steel, brick-lined combustion cylinder or furnace is located inside at the receiving end of, and fastened to, the outside drier shell by curved steel knees which provide for the differences of expansion between the inside and outside cylinders. This furnace extends a short distance through the front hood and is sealed around the outside with adjustable segment plates.

The material to be dried is fed by bucket elevator into a steel hopper and chute with renewable liners, which are a part of the drier hood. The elevator is driven by a direct gear connected motor, mounted on the steel framework of the elevator. The product to be dried is lifted by staggered steel channels fastened to the inside of the outside cylinder and to the outside of the inside cylinder. The material is, therefore, showered and cascaded downward and along through the heat, and as it passes the end of the inside cylinder, it begins to cool, due to the cold air which is pulled in from the outside by the suction fan through the four adjustable doors in the rear hood. The products of combustion from the furnace, mixed with the cooling air are discharged back through the front hood and out the stack.

New G. E. Thrustor.

Thrustor Improvements Are Announced by G. E.

A number of improvements in the G-E Thrustor, a self-contained combination of motor-driven centrifugal pump, oil chamber, and piston that produces a smooth straight-line thrust through a definite length of stroke especially suitable for the operation of clutches, brakes, valves, doors, etc., were revealed in 1934 by the General Electric Co.

The new line of Thrustors consists of a complete range of standard models providing 10 combinations of thrust and stroke ratings varying from 50 to 3200 lb. thrust and from 2 to 16 in. stroke.

In the new Thrustor, the impeller housing of the centrifugal pump is stationary, a rigid shaft running in ball bearings connecting the impeller to the driving motor. A number of driving motor arrangements are available—ac. or dc. All motors are totally enclosed (except d-c. and single-phase motors on the 50-lb. size) for protection against dirt and moisture. For single-phase service, capacitor motors are used on all Thrustors rated 100 lb. and greater thrust. For 25-cycle service, a special step-up gear train is provided to obtain the same impeller speed as that produced in 60-cycle service. For 50-cycle supply, impellers of slightly greater diameter are used to maintain rated thrust capacity.

As a smooth acting, straight-line operating device, subject to manual, remote, or fully automatic control, the Thrustor is said to be suitable for a wide variety of applications in many fields.

Lime-Treating Process Patented by W. J. Kuntz

A complete process for treating lime has been developed by William J. Kuntz, York, Pa., prominent lime-plant designer and engineer, and U. S. patent No. 1,954,211 was granted April 10, 1934, to cover this process. Briefly, this process hydrates lime and classifies it into pebble and other desired sizes. As the lime comes from the kilns it is broken down naturally by water. The water, which is heated in consequence, is employed in treating an additional quantity of lime. Another object of the invention is the breaking up of raw lime by means of water, the heated water containing lime being employed to break up fresh quantities of raw lime in a hydrator in which the steam generated rushes into the treatment zone of the hydrator and is then condensed, thus supplying the lime with further moisture under a vacuum.

Another object of the invention is to combine the grading of the lime, both hydrated and unhydrated, with the hydrating process in such manner as automati-

Willson goggles for dangerous jobs.

cally to separate out various grades of commercial lime and to work over material not entirely suitable for commercial uses until it becomes suitable, rejecting the unsuitable material.

A further object is the provision of a process in which the raw lime is broken down with water, after which the hydrated lime is aërated and dried and separated in the various stages of the selection into grades. One of the features of the process is that no lime is carried out of any of the various elements to the atmosphere. The hydrated lime when bagged is said to be in a state ready for immediate use.

The patent also provides for such changes and modifications as shall define no material departure from its salient features. Single or multiple separation of the raw lime and the hydrated lime are provided for.

Goggles Protect Wearer from Impact and Light

Willson Products, Inc., Reading, Pa., in 1934 announced the new Style DC50 goggle designed for extremely dangerous jobs. This goggle, actually two goggles in one, provides protection against impact, flying particles, etc., as well as against dangerous light rays. It is an anatomically-shaped composition cup goggle with 50 mm. clear Super-Tough lenses next the eye and 50 mm. Willson Weld lenses in a hinged frame. It is used open for chipping and closed for welding. Ample ventilation is supplied through indirect ports and the goggle is supplied with an adjustable leather nose bridge and an elastic head band.

Goodyear "G-3" tire with wider and flatter tread.

Batching Recorder Is Entirely Automatic

The Streeter-Amet Co. of Chicago, manufacturer of automatic weight recorders since 1888, have recently perfected a weighing and batching recorder which comprises:

1. Complete automatic control of all operations and any number of ingredients.
2. An automatically printed record of the actual weight of each ingredient.

It is entirely feasible to weigh out one batch of two ingredients within thirty seconds. The recorder is entirely automatic, and requires no attendants. The recorder may be stopped at any time, and will be in the proper sequence when operation is resumed.

The entire recorder is completely enclosed in a steel plate tamper-proof housing, making it well adapted for locations where the dust, dirt and grit in the atmosphere would soon wear out the knife edges and bearings on ordinary weighing equipment.

After a batch has been discharged, either a zero weight will be printed, or the actual weight of any material that may be left or stuck in the hopper.

Before the first ingredient of a new batch is dumped into the hopper, another zero weight or actual weight is automatically printed.

The recorder is furnished in two styles —one printing on continuous paper tape, the other printing on individual weigh tickets.

Greater Contact Area Is Feature of New Tire

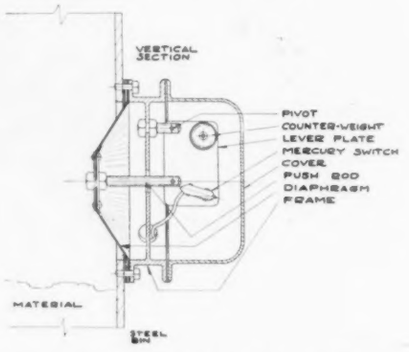
The Goodyear Tire & Rubber Co., Inc., Akron, O., announced a new tire known as the "G-3," for which an increase of 43 per cent. in non-skid mileage is claimed. This tire is named after the symbol used to identify it in the laboratory while it was undergoing tests. According to the company the difference between the G-3 All-Weather tire and any previous tire is readily apparent to the eye and consists essentially of a wider and flatter tread which has a greater area of contact with the road. As a result the load and wear is distributed over a greater surface of the tire and the traction efficiency factor is increased. Other features are more non-skid blocks in the center of the tread, wider riding ribs, narrower grooves, and an average of two pounds more rubber in the tread of each tire.

This tire was placed on the market as the result of the tread wear problem created by present day motor vehicles with their smaller wheel diameters, higher speed, faster getaway and more powerful brakes. The wider use of anti-friction surfaces on new highways is also said to have been responsible for a faster tread wear on all tires during recent years. Before being put on the market it is said that this tire was put through the most severe tests ever undergone by any tire.

Device Indicates Level of Material in Bins

The Ripley Manufacturing Co., Wayne, Mich., after years of experimentation, developed its Bin-Dicator for indicating the level of material in bins. This unit is made in two types: AV for vertical mounting and AH for horizontal mounting. It is equipped with a single-pole mercury switch, either 5 or 15 amp., which can be mounted either normally-open or normally-closed. Mounting requires one 8-in. diameter hole in the bin wall. The switch can be operated at 550 volts and can be used to operate any standard control equipment for a.c. motors up to 550 v.

The operating mechanism consists of a dust-tight canvas diaphragm which actuates a counterweighted lever, which in turn operates a mercury switch. When the material in a bin, screw conveyor, or elevator boot exerts a pressure at the point where the Bin-Dicator is mounted, the diaphragm moves outward and operates the mercury switch. When the pressure is relieved the counterweight forces the diaphragm back to normal position, reversing the operation of the mercury switch. Through the use of two Bin-Dicators on a bin at the desired levels the material level is automatically maintained between these two points.

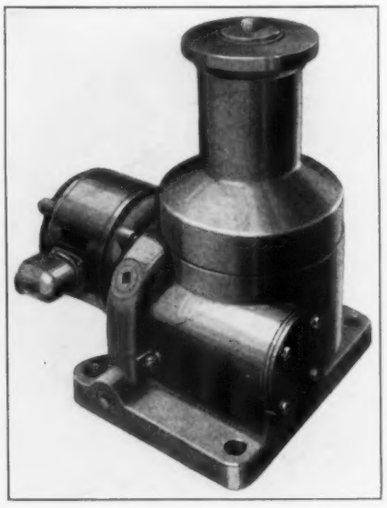


Device which automatically indicates material level in bins.

Car Spotter Motor Is Attached to Housing

The Link-Belt Co., Chicago, Ill., indicated that its vertical-capstan electric car spotter will hereafter be furnished "Motorized," meaning that the motor is to be attached direct to side of spotter housing, with the result that no motor shaft coupling or separate base plate will be required. With motor bolted to side of spotter housing, proper initial and permanent alignment of motor shaft is assured; and the plan measurements of foundation required are a minimum.

The motor shaft extends into a substantial one-piece housing, which contains all gears, a helical-gear reduction at motor, and a worm-gear set. The gears run in oil, and are readily accessible. The motor is of high-torque fully enclosed type, and can be removed as a unit complete with motor pinion, without disturbing the rest of the machine. The capstan is machine



Link-Belt vertical-capstan electric car spotter with integral drive motor at left.

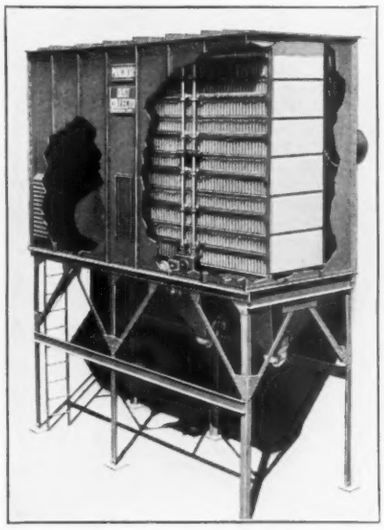
finished to prolong the life of the car haulage rope.

The Link-Belt Motorized Spotter, like its predecessor, is available in two sizes. The smaller machine has a rope pull of 5,000 lb., and the larger size, 10,000 lb.

Dust-Collector Screens Fabricated of Metal

The Pangborn Corp., Hagerstown, Md., developed the new Type CH all-metal, cloth screen dust collector for which many outstanding features are claimed. These are made in a wide range of sizes. The collector casing is made of heavy sheet steel panels supported by and bolted to a structural frame. It is dust and weather tight and has man doors for access to both dust and clear air sides. Hoppers are of heavy sheet steel with riveted packed joints.

The galvanized steel, wire-mesh, non-collapsible screen frames are non-static because they are electrically grounded. The screen beater rod is built integral with the screen. The specially-woven filter cloth is said to combine balanced physical



Pangborn all-metal cloth-screen dust collector with interior construction shown.

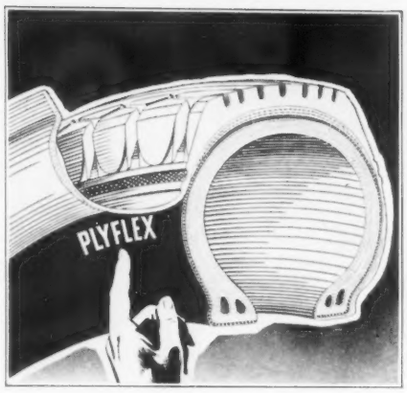
strength and high resistance to abrasion with no sacrifice of filtering value and with minimum resistance to air flow. Hoppers are provided with air and dust-tight cutoff-type valves which are sealed with adjustable rubber gaskets. Mechanically driven rotary valves are also available.

Among the features claimed are that all moving parts are on the clean side, eliminating wear, and the convenience of both dust and clean sides for inspection. The screens are of convenient size and weight, easily handled by one man, and any individual screen can be easily and quickly removed without disturbing adjacent screens, rapping device or casing sheets.

Sidewalls Reinforced in New Motor Truck Tire

A newly developed truck and bus tire, with improvements over previous construction, was announced by The B. F. Goodrich Co. as placed on sale through its nation-wide dealer organization. The new tire, known as the Goodrich Triple-Protected Silvertown, has three new protection features, Plyflex, Ply-lock and 100 per cent. full-floating cords, the manufacturer says.

Plyflex is a new, tough, sturdy rubber material and the new tire has a layer of it protecting the side-wall. This, it is said, bears the brunt of the strains caused by the tire flexing several hundred times a minute, distributes stresses throughout the carcass and prevents local weakness. Ply-



New Goodrich tire for motor trucks.

lock is a new process of locking the continuous plies of the tire around the bead, anchoring them in place and floating the tapered ply ends in rubber. Its use is said to prevent the plies tearing loose just above the bead. Full floating cord fabric used in the new product is completely "floated-in-rubber," so that every cord is entirely surrounded by rubber. This process, it is claimed, makes it possible to extend the life of the tire, since it runs cooler due to the absence of friction causing cross-cords.

Two other new products, the "Gold and Black" tube, which offers greater resistance to tear and rim chafing, and the "Seal-O-Matic," a new type puncture-sealing tube, also were announced by Goodrich during 1934.

Instrument Determines Cement-Particle Areas

The Wagner Turbidimeter manufactured and sold by E. E. W. Bowen & Co., Bethesda, Md., provides the means of determination of the specific surface (square centimeters per gram) of Portland cement.

Although designed especially for Portland cement, the Turbidimeter is adaptable to any finely divided powder such as ceramic materials, abrasives, disintegrated metals, coal, paint pigments, fillers and others.

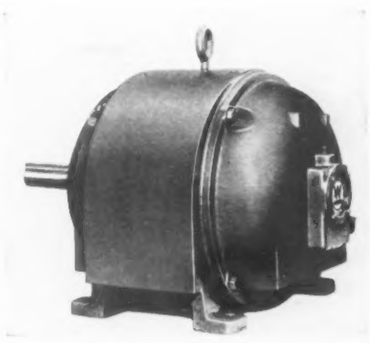
The time required to test a sample is about one-half hour. For routine work on cement from the same source the time for a single test can be reduced to less than ten minutes. The size-weight distribution is calculated from the turbidity readings.

The apparatus consists of a source of light of constant intensity which passes through a suspension of the cement in kerosene and then into a photo-electric cell. The current generated in the cell is measured with a microammeter and the readings afford a measure of the turbidity of the suspension. The relation between the turbidity of the suspension and the surface area of the suspended particles is calculated. Particle-size distribution is obtained by observing changes in turbidity as the particles settle from the suspension.

A number of cement laboratories, including those of Lehigh, Universal Atlas, Monolith, Dewey, and Whitehall are at present using the Turbidimeter with marked success.

Westinghouse Motor Is Truly Splash-Proof

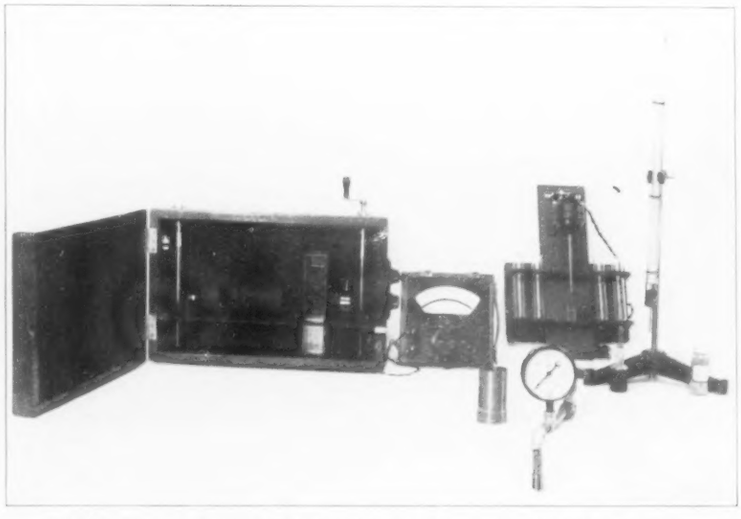
The Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., brought out a new splash-proof, drip-prooof and weather-proof motor for use indoors or outdoors or for any applications where drippings or splashing liquids are encountered. This



Westinghouse splash-proof motor with motor frame and end brackets cast solid.

motor is said to be entirely new in that it is not an adaptation of an open machine with enclosures applied around the frame, but has been built with the motor frame and end brackets of solid castings for this special class of service. The case iron being of thick cross section and inherently resistant to rust and corrosion, makes this motor highly resistant to gases. Even the conduit box is made of cast iron so that there are no exposed sheet steel parts to be attacked by corrosion.

A baffle plate cast integral with the inner side of the motor bracket prevents splashing liquids from reaching the motor windings. In fact, this motor is said to be so well protected that it may be used outdoors the year round without any additional protection.



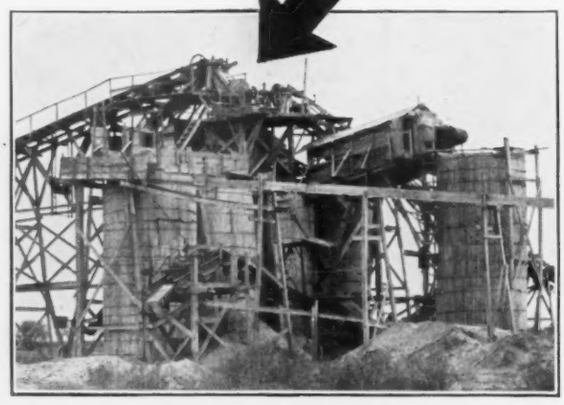
Turbidimeter equipment for determining specific surface of Portland cement.

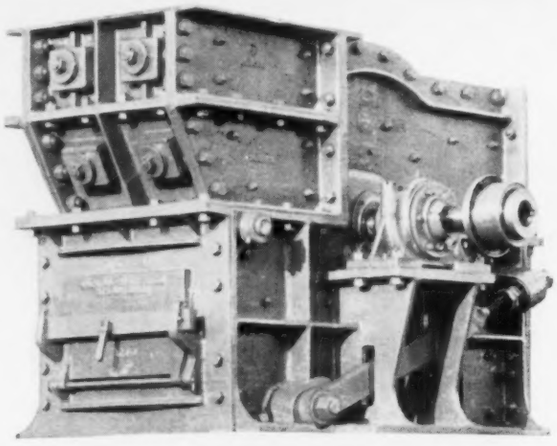
KNICKERBOCKER Soft Stone Eliminator

Shenk Bros. Gravel Co., Shiawassee County, Michigan, unable to meet State specifications relative to soft stone content, even with the aid of a picking belt, installed a Knickerbocker Soft Stone Eliminator, reduced percentage of soft stone from 10% to well below specification limit of 2%, cut production costs, opened new markets, and during the entire 1934 season did not have a single rejection due to soft stone content. How about **your** soft stone problem?

The Knickerbocker Company, 603 Liberty St., Jackson, Mich.

Here it is!





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- ☐ Hoists, Derrick
- ☐ Hoists, Drum
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- ☐ Pulverizers, Ring
- ☐ Pulverizers, Rod
- ☐ Pulverizers, Roll
- ☐ Pumps, Centrifugal
- ☐ Pumps, Deep Well
- ☐ Pumps, Sand and Gravel
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- ☐ Separators, Dry Centrifugal
- ☐ Separators, Magnetic
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- ☐ Shovels, Steam
- ☐ Skips
- ☐ Sleeves, Dredge
- ☐ Slugs and Nuggets, Grinding
- ☐ Speed Reducers and Gears
- ☐ Spray Nozzles
- ☐ Sprays, Paint
- ☐ Sprockets
- ☐ Steel, Tool
- ☐ Stokers
- ☐ Switches, Track
- ☐ Tanks, Concrete and Steel
- ☐ Tanks, Sand Settling
- ☐ Tanks, Wood
- ☐ Thickeners, Slurry
- ☐ Track, Portable
- ☐ Track Shifters
- ☐ Tractors, Crawler
- ☐ Tramways, Aerial
- ☐ Trippers, Belt
- ☐ Trippers, Tramway
- ☐ Unloaders
- ☐ Valves, Pump
- ☐ Washers and Scrubbers, Sand, Gravel, Stone
- ☐ Weighters, Automatic
- ☐ Welding Supplies
- ☐ Wheels, Car
- ☐ Winches
- ☐ Wire Cloth
- ☐ Wire Cloth, Manganese Steel

To be used for .....

Firm Name ..... *Individual* .....

Address ..... *City* ..... *State* .....

WHEN IT'S A TOUGH JOB THEY USE Williamsport

Here's one of the largest Levee jobs on the Mississippi, measuring 400 ft. from toe to toe, 43 ft. deep and runs about 30,000 yards per 100 ft. station. The pit spans range from 600 to 900 ft. requiring 1150 ft. lengths of 1½" wire rope.

These great machines are 100% equipped with Williamsport Wire Rope, giving utmost satisfaction.

We emphasize the point that when it comes to **large ropes, particularly,** we suggest that you use Williamsport for best results.

Powers Construction Company feel this way about it because they have had unhappy experiences with large ropes of other makes, and they have found Williamsport more uniform and more durable in the heavy going in which they are engaged.

Why not send your next inquiry to us and verify our claims?

Williamsport
WIRE ROPE COMPANY

Main Office and Works
Williamsport, Penna.

Branch Sales Office
122 So. Michigan Ave., Chicago

There's more on the RIGHT SIDE

Let's look at both sides of the Cordeau question.

Cordeau-Bickford is an insensitive *detonating* fuse. It consists of a lead tube filled with trinitrotoluene (TNT), which when detonated with a fuse cap or E. B. Cap carries a powerful detonating wave to all parts of the blast. This wave travels at a speed of approximately 3 miles per second.

Like any equipment, the profit-making power of Cordeau is in what it may save you — in time, labor, hazard. If you can use giant blasts, for instance, there should be no question about the benefits of Cordeau: they outweigh first costs to such an extent that the Cordeau-detonated giant blast is rapidly becoming standard practice wherever possible.

There are, however, five *general* advantages which can be weighed against practically any blasting operation. Give each of these any value you choose; you are the best judge of that:

More work from your explosives. This is because each cartridge will have the added force of a primer cartridge.

Simplified loading. No primer cartridges to be prepared. Only one connection to be made at each hole.

Less hazard. Cordeau is an insensitive detonator.

Equipment moved less often. Bigger shots are possible, with less interruption in clearing, drilling.

Better fragmentation. Shots can be planned precisely to give you good digging, easier removal.

We don't wish to over-sell you, but we do suggest that you look into this subject. Others have found the use of Cordeau very profitable. Send for the Cordeau book. The Ensign-Bickford Co., Simsbury, Conn. *Estab. 1836.*

CB-38

CORDEAU
DETONATING FUSE
BICKFORD
ALSO SAFETY FUSE *Since* 1836

THE ENSIGN-BICKFORD COMPANY

High Screening Efficiency

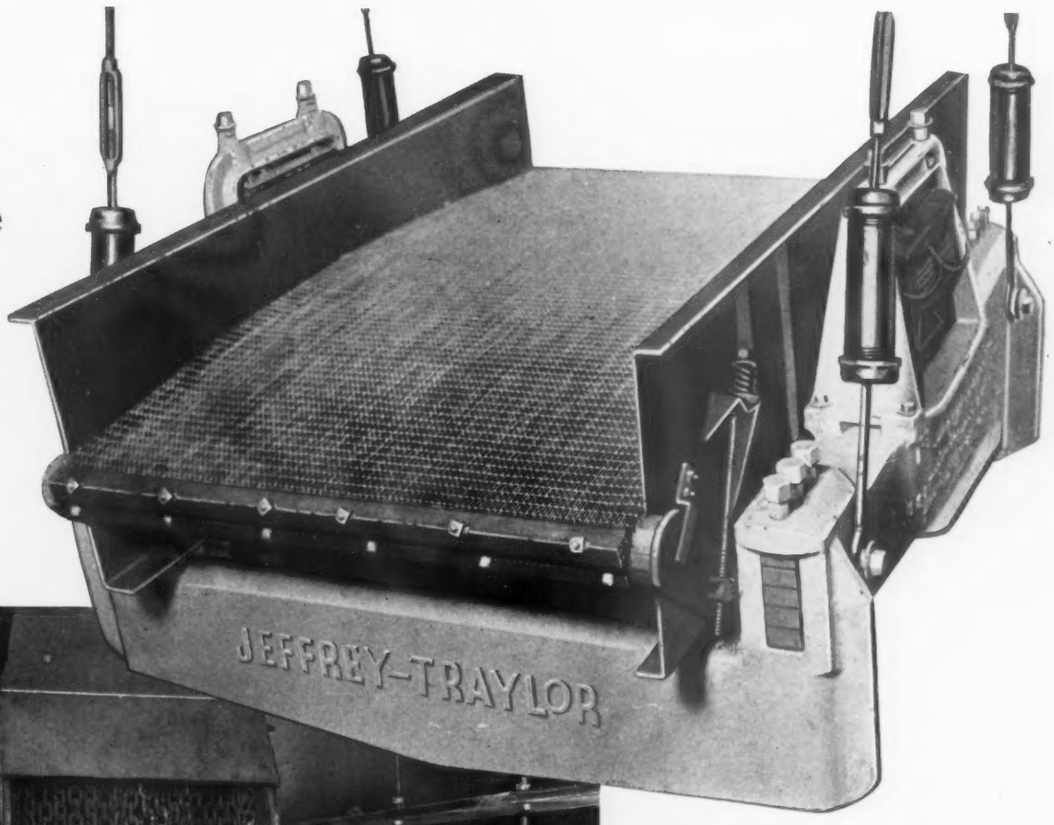
Great Capacity

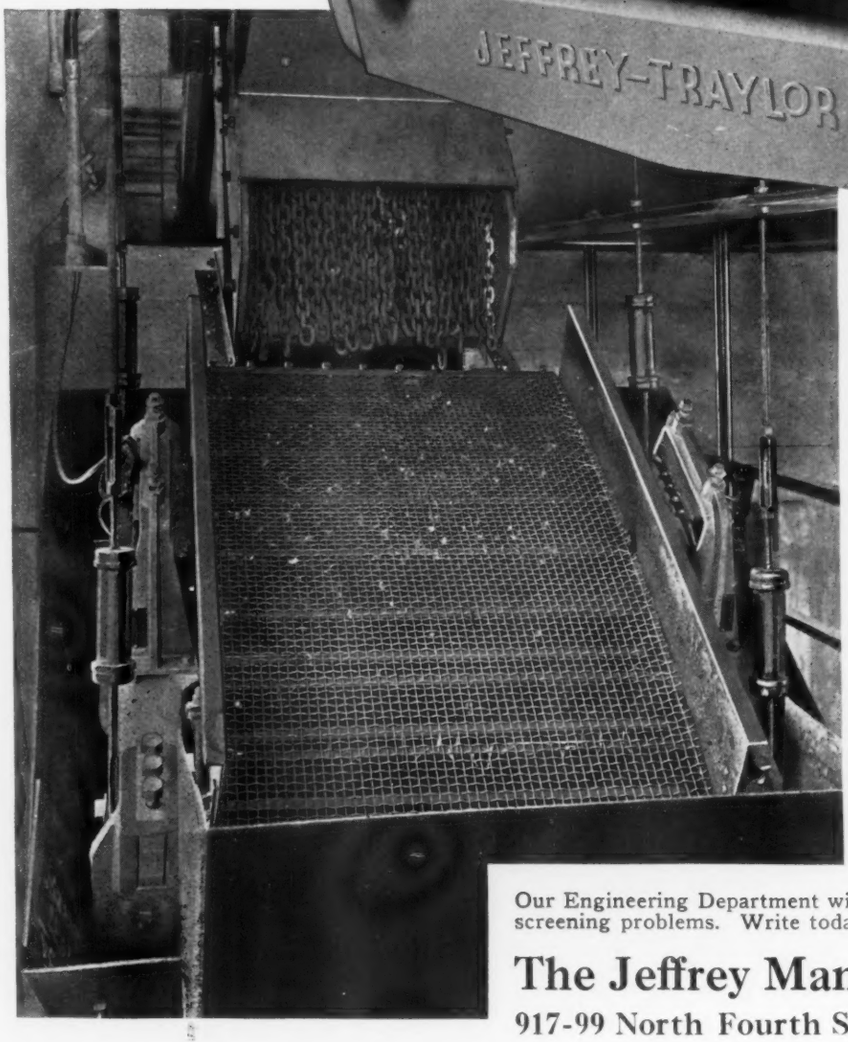
•

Dependable

Lower Operating Cost

(Patented)





with Jeffrey-Traylor Electric Vibrating Screens

Coarse and fine . . . wet and dry materials make no difference in the efficiency of the Jeffrey-Traylor Vibrating Screen. The sharp, pulsating vibration (3600 times a minute) is under positive control and can be instantly varied to meet the changing requirements of material variations. You are assured of tremendous capacities.

All vibration is confined to the screen. It is suspended from vibration absorbers. No heavy supporting structure is necessary as the installation is a simple and permanent one.

Jeffrey-Traylor Vibrating Screens are entirely electrical . . . absolutely no mechanical striking, or off-center parts, to lubricate and replace. Screen cloth changed in 5 to 10 minutes without special frame, tools or skilled labor.

A careful comparison of the Jeffrey-Traylor Screen with other types will quickly demonstrate its efficiency.

Supplied in single or multi-decked styles and in sizes ranging from two to forty square feet.

Our Engineering Department will gladly co-operate in the solution of your screening problems. Write today.

The Jeffrey Manufacturing Company

917-99 North Fourth St., Columbus, Ohio

New York Rochester, N. Y. Pittsburgh Cleveland Detroit Huntington, W. Va. Denver Birmingham
Buffalo Philadelphia Scranton, Pa. Cincinnati Chicago Milwaukee Salt Lake City Dallas
Boston Jeffrey Manufacturing Company, Ltd., of Canada. Head Office and Works, Montreal. Branch Offices, Toronto—Calgary—Vancouver

Make Your Plans Now—

1. To be in Chicago
2. From Jan. 27 to Feb. 1
3. For the concurrent conventions of the

National Crushed Stone Association
National Sand and Gravel Association
National Slag Association

—and the second annual meeting of the

National Code Authority

Meet your fellow producers. They will be there, from every section of the country. They are anxious to meet you—don't disappoint them.

Here is the place to get your ideas on codes and code administration off your chest—whether your comments are honeyed or barbed. Take advantage of this opportunity. You are a code member, and will be governed by it whether you like it or not. If you don't come you have no right to comment unfavorably. If you do come you have your opportunity to get your ideas across.

There's good fellowship, important papers that are of value to you, a machinery exhibit that you will enjoy, and a city to see that extends its world-famous hospitality to you.

Ring the dates on your calendar—and COME.

INDUSTRIAL PROGRESS EXHIBIT

A feature of the conventions is the joint exhibit of the Manufacturers' Divisions of the stone and gravel associations. Exhibit space is open to members as well as non-members. For full details write to either the National Sand and Gravel Association or the National Crushed Stone Association.

For Reservations
write to
PALMER HOUSE, CHICAGO

For Information
write your association at
Washington, D. C.

KENNEDY-VAN SAUN MFG. & ENG. CORPORATION

2 Park Avenue, New York, N. Y.

Branch Offices and Representatives in All Principal Cities

The Kennedy line of equipment is The Equipment With The Troubles Left Out. Each machine is supreme in its respective field, consumes less power and produces a greater tonnage. May we have your inquiries?

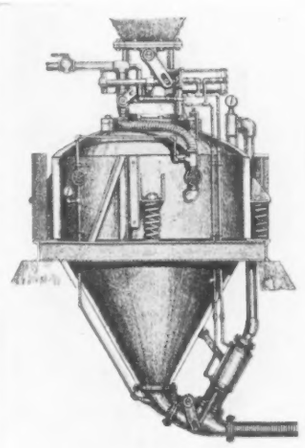
Primary Gearless Gyratory Crusher Receiving openings 3" to 66". Weight 700 to 1,000,000 lbs.

Primary Gearless Gyratory Crusher:

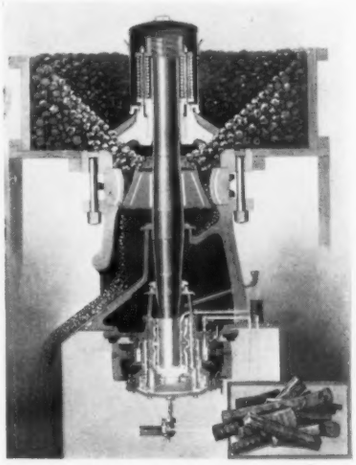
The only gyratory crusher where the dead weight is supported on ball bearings, and the entire energy applied to crushing the rock. It can be driven by a synchronous motor built in the pulley having a 200% starting torque and 250% pull out torque, thus enabling the starting of the crusher when it is full of rock, or it can be driven by a standard motor. In the event of the latter a V-belt drive is usually applied.

Pneumatic Transport System:

Ideal for transporting all kinds of powdered materials such as powdered and crushed coal, cement, etc., as well as sludges; also grain, seed, flour, etc. It has no screws, motors or other rotating parts. Its action is automatic, its power cost low and its maintenance negligible. Also built for mounting on trucks or railroad cars.



Pneumatic Transport System



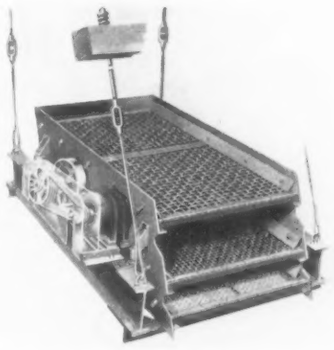
Secondary Gearless Gyratory Crusher Receiving openings 1¾" to 14". Capacities ½ to 620 tons per hr.

Secondary Gearless Gyratory Crusher:

In addition to the features described in previous paragraph the secondary crusher is equipped with a two-angle mantle and reversible top shell and 3-angle concaves. As in the case of the primary crusher, the core and mantle are self-locking and no threads are cut in the shaft, thus making it 50% stronger. The head and shaft are supported on a nest of springs which can be compressed, permitting the head to move downward and allowing steel to pass without damaging the crusher. The capacities listed in our catalogue are usually materially exceeded.

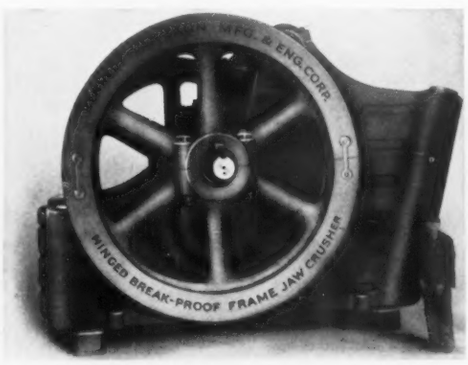
Vibrating Screen:

A screen of high capacity with low power consumption, and occupies a minimum of space. It is built over a wide range of capacities, having screens of 1, 2, 3 or 4 decks. The classification of materials with this machine is, without doubt, the best of any machine on the market. It is suitable for stone, coal and many types of crushed products. Our experience in building this type of equipment enables us to say that it has many improvements not found in other similar types of screens which make ours the most desirable to the operator.



Vibrating Screen

Hinged Break-Proof Steel Frame Jaw Crusher:

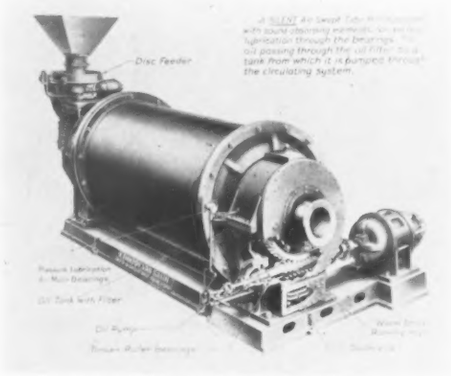


Hinged Break-Proof Steel Frame Jaw Crusher Receiving openings from 4"x6" to 96"x66".

Guaranteed against frame failure where 99% of the breakage in other makes of jaw crushers occur. The open hearth steel swing jaw with gudgeons cast integral eliminates rocker shaft troubles. Positive pressure lubrication to all moving parts is assured.

Worm-Driven Air-Swept Tube Mill:

For pulverizing coal, minerals, chemicals and other materials, and used in connection with the simple direct method of firing boilers, open hearth and continuous billet heating furnaces, and cement kilns. Capacities of kilns have been increased 25%, and a better grade of clinker was obtained. Minimum cost of maintenance, elimination of smoke and dust. Furnished with either gear or worm drive. With our patented sound absorbing device it is practically noiseless.



Worm-Driven Air-Swept Tube Mill

Ask for Bulletin No. 16 which illustrates and describes our Mining, Crushing, Cement, Elevating, Conveying, and Classifying Equipment, and for Bulletin No. 12, our power plant equipment. These catalogues will make handy references in any file.

Classified Buyers' Guide

A Directory of Pit and Quarry Advertisers Arranged According to Product

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified, if brought to the attention of the Advertisers' Service Department.

Index to Advertisers on Page 64

Aggregate-Bituminizing Plants
Hetherington & Berner, Inc.

Agitating Ladders (Dredge)
*Eagle Iron Works
Pettibone Mulliken Co.

Agitators, Thickeners and Slurry Mixers
*Hardinge Co.
* Smidth & Co., F. L.

Air Compressors (Portable)
Fuller Co.
Gardner-Denver Co.
*Ingersoll-Rand Co.

Air Compressor (Stationary)
Fuller Co.
Gardner-Denver Co.
*Ingersoll-Rand Co.

Air Filters
*Blaw-Knox Co.

Air Pumps
Fuller Co.
Gardner-Denver Co.
*Ingersoll-Rand Co.

Air Separators
Gay, Rubert M.
*Gruendler Crusher & Pulv. Co.
*Hardinge Co.
Raymond Bros. Impact Pulv. Co.
Universal Road Mchy. Co.

Alloys (Steel)
Cement Mill Equip. Co.
Chicago Steel Fdry. Co.

Arresters (Lightning)
*General Electric Co.

Ash and Refuse-Handling Equipment
Allen-Sherman-Hoff Co.
American Manganese Steel Co.
Good Roads Machy. Corp.
Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Automatic Feeders
American Manganese Steel Co.
Fuller Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Automatic Weighers
Fuller Co.
*Blaw-Knox Co.
*Merrick Scale Mfg. Co.

Backfillers
*Austin-Western Road Machy. Co.

Balls (Grinding)
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Balls (Tube-Mill, etc.)
*Allis-Chalmers Mfg. Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Smidth & Co., F. L.

Baskets (Dipping)
Buffalo Wire Works Co.

Bearings (Anti-Friction)
Hetherington & Berner, Inc.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belting
Goodyear Tire & Rubber Co.
Haiss Mfg. Co., Geo.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.
*Wickwire Spencer Steel Co.

Belt Lacings
Flexible Steel Lacing Co.

Belting (Multiple V)
Goodyear Tire & Rubber Co.

Bin Gates
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Fuller Co.
Good Roads Machy. Corp.
*Jeffrey Mfg. Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.

Bins (Cast Iron)
Allen-Sherman-Hoff Co.

Bins (Steel)
*Austin-Western Road Machy. Co.
*Blaw-Knox Co.
Diamond Iron Works
*Hendrick Mfg. Co.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Blast-Hole Drills (See Drills—Blast-Hole)

Blasting Supplies
*Ensign-Bickford Co.

Blocks (Sheave)
American Manganese Steel Co.
Haiss Mfg. Co., Geo.
Sprout, Waldron & Co.

Bodies (Motor Truck, Concrete Mixing)
*Blaw-Knox Co.
Jaeger Machine Co.

Borings, Core
Mott Core Drilling Co.
Pennsylvania Drilling Co.

Breakers (Circuit)
*General Electric Co.

Bronze Work (Ornamental)
Buffalo Wire Works Co.
National Wire Cloth Co.
Smith Wire & Iron Works, F. P.
*Tyler Co., W. S.

Bucket Elevators (See Conveyors and Elevators)

Buckets (Clamshell, Orange-Peel, Etc.)
*Blaw-Knox Co.
Haiss Mfg. Co., Geo.
*Link-Belt Co.
Pettibone Mulliken Co.
Wellman Engr. Co.

Buckets (Dragline—Cableway)
American Manganese Steel Co.
*Link-Belt Co.
Wellman Engr. Co.

Buckets (Elevator and Conveyor)
Chicago Steel Fdry. Co.
Cross Engr. Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Pettibone Mulliken Co.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.

Bulk-Cement Storage Plants
Sprout, Waldron & Co.

Cableways
*American Steel & Wire Co.
*Link-Belt Co.
*Wickwire Spencer Steel Co.

Capstans (See Winches and Capstans)

Car Dumpers
*Link-Belt Co.
Wellman Engr. Co.

Car Pullers
*Jeffrey Mfg. Co.
*Link-Belt Co.

Cars (Quarry and Gravel Pit)
*Austin-Western Road Machy. Co.

Carriers
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.

Car Wheels — (See Wheels — Car)

Castings
American Manganese Steel Co.
Chicago Steel Fdry. Co.
Cement Mill Equip. Co.
*Eagle Iron Works
*Hardinge Co.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
Pettibone Mulliken Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Cement Pumps (See Pumps; Air Pumps; Pumps, Cement Slurry; Pumps, Bulk Cement)

Central Concrete-Mixing Plants (Complete)
Sprout, Waldron & Co.

Chain Drives
*Link-Belt Co.

Chain (Elevating and Conveying)
American Manganese Steel Co.
Cross Engr. Co.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

Chutes and Chute Liners
American Manganese Steel Co.
Cross Engr. Co.
Goodyear Tire & Rubber Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
*Robins Conveying Belt Co.
*Smidth & Co., F. L.
Sprout, Waldron & Co.

Classifiers
Deister Machine Co.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Knickerbocker Co.
Lewistown Foundry & Machine Co.
*Link-Belt Co.

Clips (Wire Rope)
*American Steel & Wire Co.
*Wickwire Spencer Steel Co.

Clutches
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

Coal
Technicoal Sales Corp.

Coal-Pulverizing Equipment
*Allis-Chalmers Mfg. Co.
Bonnot Co.
Gay, Rubert M.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Raymond Bros. Impact Pulv. Co.
Universal Road Machy. Co.

Compressors (See Air Compressors)

Concrete Breakers (Air)
*Ingersoll-Rand Co.

Concentrators (Slurry)
*Deister Concentrator Co.

Condensers
*Ingersoll-Rand Co.

Cones (Sand-Washing)
*Link-Belt Co.
Smith Engr. Works

Controllers (Electric)
*General Electric Co.

Converters (Electric)
*General Electric Co.

Conveyor Belting (See Belting)

Conveyor Idlers and Rolls
Diamond Iron Works
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Conveyors and Elevators
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Chicago Steel Fdry. Co.
Cross Engr. Co.
Diamond Iron Works
Fuller Co.
Good Roads Machy. Corp.
*Gruendler Crusher & Pulv. Co.
Haiss Mfg. Co., Geo.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Universal Crusher Co.
Universal Road Machy. Co.

Conveyors (Ready-Mixed Concrete)
*Blaw-Knox Co.
Haiss Mfg. Co., Geo.
Jaeger Machine Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Coolers (Clinker)
Cement Mill Equip. Co.
*Smidth & Co., F. L.

Coolers (See Kilns and Coolers—Rotary)

Correcting Basins
*Smidth & Co., F. L.

Couplings (Flexible and Shaft)
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Cranes (Crawler and Locomotive)
*Austin-Western Road Machy. Co.
Koehring Co.
*Link-Belt Co.
National Equip. Corp.
Ohio Power Shovel Co.

Crusher Parts
American Manganese Steel Co.
*American Pulverizer Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
Pettibone Mulliken Co.

Crushers (Cone)
*Nordberg Mfg. Co.

Crushers (Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
Bonnot Co.
*Dixie Machy. Mfg. Co.
Good Roads Machy. Corp.
*Gruendler Crusher & Pulv. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Universal Crusher Co.

Crushers (Jaw and Gyratory)
*Allis-Chalmers Mfg. Co.
*Austin-Western Road Machy. Co.
Diamond Iron Works
Good Roads Machy. Corp.
*Gruendler Crusher & Pulv. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Nordberg Mfg. Co.
Smith Engr. Works
*Universal Crusher Co.
Universal Road Machy. Co.

Crushers (Ring)
*American Pulverizer Co.

Crushers (Roll)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
Bonnot Co.
Diamond Iron Works
*Gruendler Crusher & Pulv. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.

Crushers (Rotary)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
Bonnot Co.

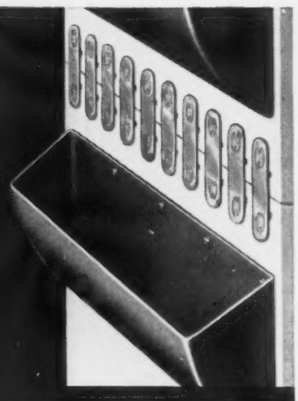
Crushing Rolls
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.

*** See also information in the 1934 Pit and Quarry HANDBOOK.**

FLEXCO HD

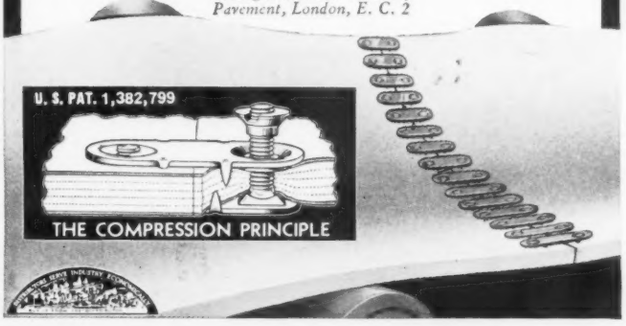
Reg. U. S. Pat. Off.

BELT FASTENERS *for* ELEVATORS *and* CONVEYORS

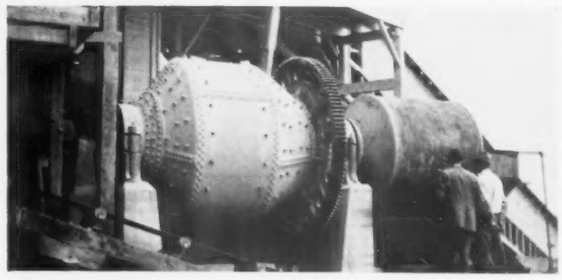


COMPRESSION develops the tremendous strength of the FLEXCO HD joint. The recessed plates and teeth embed in the belt, producing a smooth, powerful, tight butt joint of balanced pull. Plies cannot work against each other and separate in belt ends. Remarkable service records are developed by these fasteners and thousands of plants use nothing else. Made of steel or Monel Metal. Templates, wrenches and punches supplied to facilitate application. Sold by jobbers and belting houses in five sizes. Consulting service given gladly regarding any belt joining.

FLEXIBLE STEEL LACING COMPANY
4623 Lexington Street, Chicago
In England at 135 Finsbury Pavement, London, E. C. 2



HARDINGE



SCRUBBERS

This is the Scrubber that cleans—sand, gravel and stone under mass pressure. It uses no internal moving parts. Write for Bulletin 37.

WASHERS

The only Washer for sand and gravel that has no internal moving parts and prevents re-mixing of silt with gravel and sand already cleaned. Write for Bulletin 39.

HARDINGE COMPANY

YORK, PA.—Main Office & Works CHICAGO—205 W. Wacker Dr.
NEW YORK—122 E. 42nd St. SAN FRANCISCO—444 Market St.

New STATIONARY SHAFT ROLL CRUSHER

WITH BEARINGS INSIDE THE ROLLS

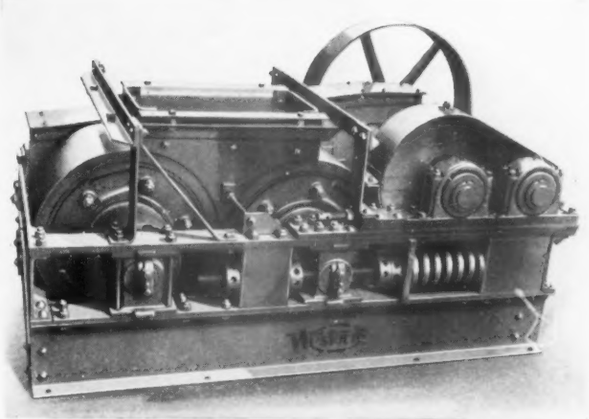
● With shells and bearings *revolving* on stationary rather than live shafts, and SKF roller bearings rather than plain bearings, the Western Roll Crusher concentrates the load at a point exceptionally close to the supporting frame.

Stationary shafts have the further advantage of insuring perfect bearing alignment at all times. In other types of construction the bearings must move parallel to the frame as the springs compress during the crushing operation, and since the two bearings on the same shaft seldom move exactly alike, there is almost always misalignment with resultant heating and excessive wear. Western design keeps the bearings in line at all times.

Other important features in this fine reduction crusher are:

1. **2-inch Manganese steel shells.**
2. **A roller chain drive for the rolls.**
3. **A counter-shaft for direct motor drive.**
4. **Easy adjustment of rolls for material from 1½ inches to dust.**

THE AUSTIN-WESTERN ROAD MACHINERY CO.
Home Office: Aurora, Ill. Cable Address: AWCO, Aurora
Branches in Principal Cities



WESTERN No. 3018 ROLL CRUSHER. Capacity: ½" and finer, 22 to 28 cu. yds. per hour. Capacity: 1-¼" - 55 to 70 cu. yds. per hour. Maximum feed sizes, 1-¼" to 1-¾", plus spread of shells.

Fill in the coupon for full description of these and other details described in Bulletin 1358 A. D.

Austin-Western

ROAD ROLLERS, CRUSHING & SCREENING PLANTS, SCARIFIERS, SWEEPERS & SPRINKLERS, ROAD GRADERS, ELEVATING GRADERS, MOTOR GRADERS, DRAGS, SHOVELS, DISTRIBUTORS, WAGONS, SNOW PLOWS.

The Austin-Western Road Machinery Co.
A-7, Aurora, Illinois
Please send Bulletin 1358 A. D., giving the facts on the new Western Roll Crusher No. 3018.

Name .....
Firm Name ..... State .....
Address .....
City .....

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

Index to Advertisers on Page 64

Bonnot Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan and Stone Corp.

Diesel Engines (See Engines—Diesel)

Dippers and Teeth (Power Shovel)
American Manganese Steel Co.
Koehring Co.
National Equip. Corp.
Pettibone Mulliken Co.

Doors (Iron)
Smith Wire & Iron Works, F. P.

Dragline Cableway Excavators
Good Roads Machy. Corp.
*Link-Belt Co.

Dragline Excavators
*Austin-Western Road Machy. Co.
Koehring Co.
*Link-Belt Co.
National Equip. Corp.
Ohio Power Shovel Co.

Dredges
Hetherington & Berner, Inc.
*Morris Machine Works

Drilling Contractors
Mott Core Drilling Co.
Pennsylvania Drilling Co.

Drills (Blast-Hole)
*Ingersoll-Rand Co.
Gardner-Denver Co.

Drills (Core)
*Ingersoll-Rand Co.
Mott Core Drilling Co.
Pennsylvania Drilling Co.

Drills, Diamond
Mott Core Drilling Co.
Pennsylvania Drilling Co.

Drills (Rock)
Gardner-Denver Co.
*Ingersoll-Rand Co.
*Jeffrey Mfg. Co.

Drills (Well) (See Drills—Blast-Hole)

Drill Bits
*Ingersoll-Rand Co.

Drill Sharpening Machinery
Gardner-Denver Co.
*Ingersoll-Rand Co.

Drill Steel
*Ingersoll-Rand Co.

Drives (Multiple, Belt, Chain, Rope)
*Allis-Chalmers Mfg. Co.

Dryers
*Allis-Chalmers Mfg. Co.
Bonnot Co.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mch. Co.
McLanahan and Stone Corp.
*Tyler Co., W. S.

Dust Arrestors
*Blaw-Knox Co.

Dust-Collecting Systems
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
*Blaw-Knox Co.
Raymond Bros. Impact Pulv. Co.

Dust Conveying Systems
Fuller Co.

Dust Handling Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Dust Hoods and Helmets
Pulmosan Safety Equipment Corp.

Dynamite (See Explosives)

Electrical Equipment
*Allis-Chalmers Mfg. Co.
*General Electric Co.

Elevator Belting (See Belting)

Elevators (See Conveyors and Elevators)

Eliminators (Soft Stone) (See Soft Stone Eliminators)

Engineers
*Allis-Chalmers Mfg. Co.
Bonnot Co.
Cross Engr. Co.
Fuller Co.
Hetherington & Berner, Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Smidth & Co., F. L.
Sprout, Waldron & Co.

Engine Generator Sets
See Generator Sets (Engine).

Engines (Diesel)
*Ingersoll-Rand Co.
*Nordberg Mfg. Co.

Engines (Steam)
*Ingersoll-Rand Co.
*Morris Machine Works
*Nordberg Mfg. Co.

Excavating Machinery (See Shovels; Cranes; Buckets, etc.)

Excavators—Shallow Grading (Bucket Elevator Type)
Haiss Mfg. Co., Geo.

Fans (Exhaust)
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Feeders
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Bonnot Co.
Diamond Iron Works
Fuller Co.
Good Roads Machy. Corp.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
Morrow Mfg. Co.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.

Fencing (Woven Wire)
*American Steel & Wire Co.
Buffalo Wire Works Co.
Smith Wire & Iron Works, F. P.

Fire Escapes
Smith Wire & Iron Works, F. P.

Floor Sweeping Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Forges (Oil)
Gardner-Denver Co.

Fuses (Detonating)
*Ensign-Bickford Co.

Fuses (Electrical)
*General Electric Co.

Gaskets
Goodyear Tire & Rubber Co.

Gasoline Engines (See Engines—Internal-Combustion)

Gas Producers
Wellman Engr. Co.

Gates (Bin) (See Bin Gates)

Gates (Clamshell)
Haiss Mfg. Co., Geo.
*Link-Belt Co.

Gears (Herringbone)
*General Electric Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Sprout, Waldron & Co.

Gears and Pinions
*General Electric Co.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Pettibone Mulliken Co.
Sprout, Waldron & Co.

Gelatin (See Explosives)

Generators (See Motors and Generators)

Generator Sets (Engine)
*General Electric Co.

Generator Sets (Motor)
*General Electric Co.

Generator Sets (Turbine)
*General Electric Co.

Glass Sand Equipment
Lewistown Foundry & Machine Co.

Goggles
Pulmosan Safety Equipment Corp.

Grab Buckets (See Buckets—Clamshell, Orange - Peel, etc.)

Grating (Steel)
*Blaw-Knox Co.
*Hendrick Mfg. Co.

Grinding Balls (See Balls, Grinding)

Grizzlies
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
*Eagle Iron Works
Good Roads Machy. Corp.
*Hendrick Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdy. & Mach. Co.
Pettibone Mulliken Co.
*Robins Conveying Belt Co.
Smith Engr. Works
Universal Road Machy. Co.

Guards (Wire)
National Wire Cloth Co.
Smith Wire & Iron Works, F. P.

Guns (Hydraulic)
Hetherington & Berner, Inc.
*Taylor Forge & Pipe Works

Hammer Mills (See Crushers—Hammer)

Haulage Systems (Electric)
*General Electric Co.

Hoists
Gardner-Denver Co.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Ingersoll-Rand Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Smith Engr. Works
Sprout, Waldron & Co.

Hoppers
*Hendrick Mfg. Co.
*Link-Belt Co.

Hose (Air, Steam and Water)
Goodyear Tire & Rubber Co.
*Ingersoll-Rand Co.

Hose Couplings (See Couplings)

Hydraulic Guns (See Guns—Hydraulic)

Idlers
American Manganese Steel Co.
Good Roads Machy. Corp.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.

Kilns and Coolers (Rotary)
*Allis-Chalmers Mfg. Co.
Bonnot Co.
Cement Mill Equip. Co.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lime & Hydrate Plants Co.
*Smidth & Co., F. L.

Kilns (Vertical)
*Hardinge Co.
Lime & Hydrate Plants Co.

Kominuters
*Smidth & Co., F. L.

Lights (Flood)
*General Electric Co.

Lime-Handling Equipment
Fuller Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Raymond Bros. Impact Pulv. Co.
*Robins Conveying Belt Co.

Lime and Hydrating Plants
*Hardinge Co.
Lime & Hydrate Plants Co.

Lime Kilns
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lime & Hydrate Plants Co.

Linings (Ball- and Tube-Mill) (See Mill Liners and Linings)

Loaders and Unloaders
Fuller Co.
Good Roads Machy. Corp.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Locomotives (Diesel)
*Fate-Root-Heath Co.
*Plymouth Locomotive Works

Locomotives (Diesel-Electric)
*Fate-Root-Heath Co.
*General Electric Co.
*Plymouth Locomotive Works

Locomotives (Electric, Gas and Steam)
*Fate-Root-Heath Co.
*General Electric Co.
*Lima Locomotive Works
*Plymouth Locomotive Works

Locomotives (Gas-Electric)
*Fate-Root-Heath Co.
*General Electric Co.
*Plymouth Locomotive Works

Locomotives (Oil-Electric)
*Fate-Root-Heath Co.
*General Electric Co.
*Plymouth Locomotive Works

Locomotives (Storage Battery)
*General Electric Co.

Locomotives (Trolley-Battery)
*General Electric Co.
*Jeffrey Mfg. Co.

Magnetic Pulleys (See Pulleys, Magnetic)

Manganese Steel
American Manganese Steel Co.
Pettibone Mulliken Co.

Manganese Steel (Plates and Sheets)
American Manganese Steel Co.
Pettibone Mulliken Co.

Measuring Devices (Electric)
*General Electric Co.

Mill Liners and Linings
American Manganese Steel Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Smidth & Co., F. L.

Mills (Grinding) (See also Crushers—Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Bonnot Co.
*Hardinge Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Knickerbocker Co.
Lewistown Fdy. & Mch. Co.
Raymond Bros. Impact Pulv. Co.
*Smidth & Co., F. L.
Sprout, Waldron & Co.

Motor Trucks
Mack Trucks, Inc.

Motors and Generators
*Allis-Chalmers Mfg. Co.
*General Electric Co.

Motors (Internal-Combustion) (See Engines — Internal-Combustion)

Nails
*American Steel & Wire Co.

Netting (Locomotive Stack)
Buffalo Wire Works Co.
Smith Wire & Iron Works, F. P.
*Tyler Co., W. S.

Nozzles (Gravel Washing)
*Deister Concentrator Co.

Nozzles (Hydraulic) (See Guns—Hydraulic)

Nozzles (Spray)
*Deister Concentrator Co.

Packings
Goodyear Tire and Rubber Co.

Partitions (Wire)
Buffalo Wire Works Co.
National Wire Cloth Co.
Smith Wire & Iron Works, F. P.

Perforated Metal Plates
*Allis-Chalmers Mfg. Co.
Chicago Perforating Co.
Cross Engr. Co.
*Hendrick Mfg. Co.
Morrow Mfg. Co.
Sprout, Waldron & Co.
*Wickwire Spencer Steel Co.

Pipe, Dredge (Floating and Shore)
*Taylor Forge & Pipe Works

Pipe Flanges
Hetherington & Berner, Inc.
*Taylor Forge & Pipe Works

Plug Valves (See Valves)

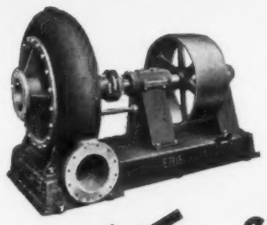
Pneumatic Drills (See Drills, Rock)

Portable Conveyors
Fuller Co.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Sprout, Waldron & Co.

Portable Crushing and Screening Plants
*Austin-Western Road Machy. Co.
Diamond Iron Works
Good Roads Machy. Corp.
*Gruendler Crusher & Pulv. Co.
*Jeffrey Mfg. Co.
*Universal Crusher Co.

Portable Engines (See Engines—Internal Combustion)

*** See also information in the 1934 Pit and Quarry HANDBOOK.**



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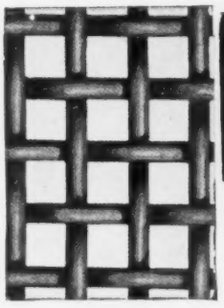
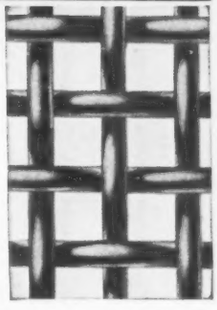


National WIRE CLOTH



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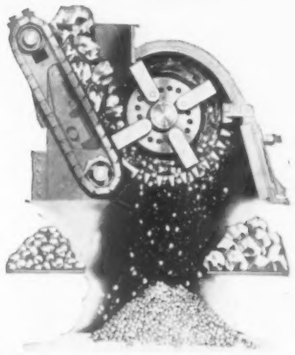

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4209 Goodfellow Ave. St. Louis, Missouri

Classified Buyers' Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

Index to Advertisers on Page 61

Portable Loaders (See Loaders and Unloaders)

Power Cables (Rubber Clad)
*American Steel & Wire Co.

Power Shovels (See Shovels, Electric, Internal-Combustion and Steam)

Pulleys (Magnetic)
Sprout, Waldron & Co.

Pulleys (Wing)
Sprout, Waldron & Co.

Pulverized Fuel Systems
Gay, Rubert M.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Raymond Bros. Impact Pulv. Co.
Universal Road Machy. Co.

Pulverizers (See also Crushers; Mills; etc.)
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
Bonnot Co.
*Hardinge Co.
*Gruendler Crusher & Pulv. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Knickerbocker Co.
Lewistown Foundry & Machinery Co.
Raymond Bros. Impact Pulv. Co.
*Smidth & Co., F. L.
*Universal Crusher Co.

Pump Valves (See Valves Pump)

Pumps (Air-Lift)
Fuller Co.
*Ingersoll-Rand Co.

Pumps (Bulk Cement)
Fuller Co.

Pumps (Cement Slurry)
Allen-Sherman-Hoff Co.
*Morris Machine Works
*Smidth & Co., F. L.

Pumps (Centrifugal)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
*Ingersoll-Rand Co.
Kansas City Hay Press Co.
*Morris Machine Works
Pettibone Mulliken Co.

Pumps (Dredging)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
*Morris Machine Works
Pettibone Mulliken Co.

Pumps (Sand and Gravel)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
*Ingersoll-Rand Co.
Kansas City Hay Press Co.
*Morris Machine Works
Pettibone Mulliken Co.

Pumps (Vacuum)
Fuller Co.

Respirators
Pulmosan Safety Equipment Corp.

Rheostats
*General Electric Co.

Rock Drills (See Drills—Rock)

Rod Mills
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Rope (Wire) (See Wire Rope)

Rubbish Burners
Cross Engr. Co.

Safety Equipment
Pulmosan Safety Equipment Corp.

Sand Separators
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Smith Engr. Works

Sand—Lime—Brick Machinery
*Hardinge Co.

Sand-Settling Tanks
Good Roads Machy. Corp.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Smith Engr. Works

Scales
*Merrick Scale Mfg. Co.

Scrapers (Power Drag)
*Austin-Western Road Machy. Co.
*Link-Belt Co.

Screens
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Audubon Wire Cloth Corp.
Buffalo Wire Works Co.
Chicago Perforating Co.
*Deister Concentrator Co.
Deister Machine Co.
Diamond Iron Works
*Eagle Iron Works
Haiss Mfg. Co., Geo.
*Gruendler Crusher & Pulv. Co.
Gay, Rubert M.
Good Roads Machy. Corp.
*Hardinge Co.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Morrow Mfg. Co.
National Wire Cloth Co.
*Nordberg Mfg. Co.
Productive Equip. Corp.
*Robins Conveying Belt Co.
Smith Engr. Works
Smith Wire & Iron Works, F. P.
Sprout, Waldron & Co.
*Tyler Co., W. S.
*Universal Crusher Co.
Universal Road Machy. Co.
*Wickwire Spencer Steel Co.

Screens (Vibrating or Shaking)
*Allis-Chalmers Mfg. Co.
*Austin-Western Road Machy. Co.
Buffalo Wire Works Co.
*Deister Concentrator Co.
Deister Machine Co.
Diamond Iron Works
Good Roads Machy. Corp.
*Gruendler Crusher & Pulv. Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Nordberg Mfg. Co.
Productive Equip. Corp.
*Robins Conveying Belt Co.
Smith Engr. Works
Sprout, Waldron & Co.
*Tyler Co., W. S.
*Universal Crusher Co.

Scrubbers
Knickerbocker Co.
*Tyler Co., W. S.

Separators (Air) (See Air Separators)

Separators (Slurry)
*Smidth & Co., F. L.

Sheaves
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
*Eagle Iron Works
*Gruendler Crusher & Pulv. Co.
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
Hetherington & Berner, Inc.
*Link-Belt Co.
McLanahan and Stone Corp.
Pettibone Mulliken Co.
Sprout, Waldron & Co.

Shovels (Electric, Internal Combustion and Steam)
*Austin-Western Road Machy. Co.
Koehring Co.
*Link-Belt Co.
National Equip. Corp.
Ohio Power Shovel Co.

Silos
*Smidth & Co., F. L.

Skip Hoists and Skips
*Allis-Chalmers Mfg. Co.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Soft Stone Eliminators
Knickerbocker Co.

Speed Reduction Units
*General Electric Co.
*Link-Belt Co.

Spouts (See Chutes and Chute Liners)

Sprays
*Deister Concentrator Co.

Sprockets and Chain
American Manganese Steel Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Pettibone Mulliken Co.
Sprout, Waldron & Co.

Stackers
*Jeffrey Mfg. Co.

Stairs (Iron)
Smith Wire & Iron Works, F. P.

Stairs (Mine)
Smith Wire & Iron Works, F. P.

Starters (Automatic, Motor)
*General Electric Co.

Steel (Alloy)
(See Alloys—Steel)

Steel Grating (See Grating, Steel)

Steel Inclines (See Inclines, Steel)

Steel Plate Construction
*Hendrick Mfg. Co.
Hetherington & Berner, Inc.
Sprout, Waldron & Co.

Storage Equipment
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Sweeping Systems
Allen-Sherman-Hoff Co.

Switchboards (Electric)
*General Electric Co.

Switches (Safety)
*General Electric Co.

Tanks
*Hendrick Mfg. Co.
*Link-Belt Co.

Tanks (Sand-Settling)
Good Roads Machy. Corp.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Morrow Mfg. Co.
Smith Engr. Works

Testing Sieves and Shakers
*Hendrick Mfg. Co.
*Tyler Co., W. S.

Thickeners (Slurry)
*Hardinge Co.
*Smidth & Co., F. L.

Tires (Truck)
Goodyear Tire & Rubber Co.

Tools (Drill) (See Drilling Accessories)

Track Equipment
Pettibone Mulliken Co.

Track Shifters
*Nordberg Mfg. Co.

Tractors
*Allis-Chalmers Mfg. Co.
*Fate-Root-Heath Co.
*Plymouth Locomotive Works

Trailers
Mack Trucks, Inc.

Tramways (Aerial)
*American Steel & Wire Co.

Transformers
*Allis-Chalmers Mfg. Co.
*General Electric Co.

Transmission Belting (See Belting)

Transmission Machinery
*Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
*Gruendler Crusher & Pulv. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Trippers
Good Roads Machy. Corp.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Truck Cranes (See Cranes)

Truck Mixers
*Blaw-Knox Co.
Jaeger Machine Co.

Trucks and Trailers (See Motor Trucks)

Tube-Mills (See Mills—Ball, Tube, etc.)

Underground Loaders
*Allis-Chalmers Mfg. Co.

Unit Heaters
*General Electric Co.

Unloaders (Box Car)
Fuller Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Variable Speed Reducers or Transmissions
*Link-Belt Co.

Valves (Pump)
*Taylor Forge & Pipe Works

Vibrating Screen Plate
Chicago Perforating Co.
Cross Engr. Co.
*Hendrick Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Morrow Mfg. Co.

Vibrating Screens (See Screens—Vibrating)

Vibrators
*Jeffrey Mfg. Co.
*Tyler Co., W. S.

Washers (Sand, Gravel and Stone)
*Allis-Chalmers Mfg. Co.
Diamond Iron Works
*Eagle Iron Works
Good Roads Machy. Corp.
Haiss Mfg. Co., Geo.
*Hardinge Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Knickerbocker Co.
Lewistown Foundry & Machinery Co.
*Link-Belt Co.
McLanahan and Stone Corp.
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It delivers an absolutely uniform product of any fineness desired from 60 to 400 mesh with greater capacity and lower power cost than is possible with any other type of air separator.

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Pioneers in the perforating of metal for screening purposes, Hendrick offers a complete line for the quarry operator:

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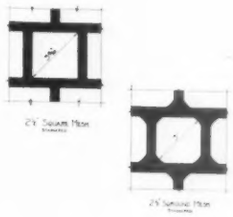

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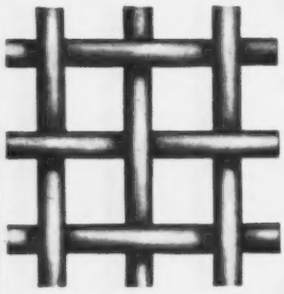

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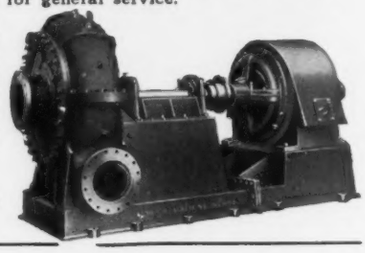

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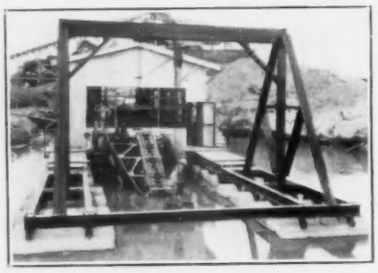

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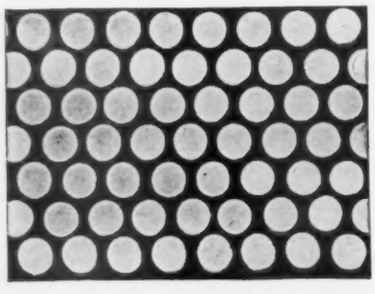

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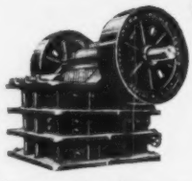

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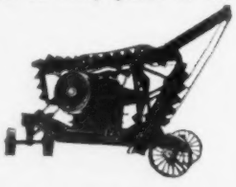

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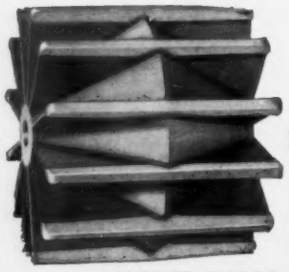

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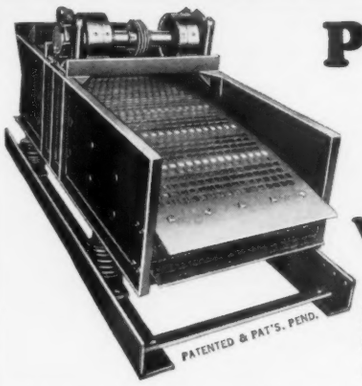

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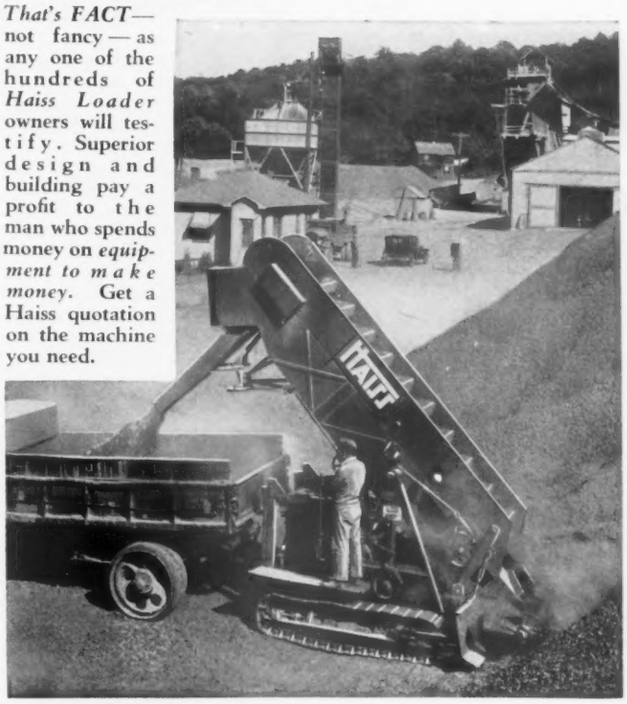

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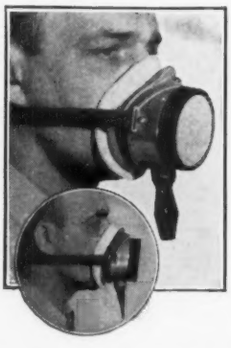

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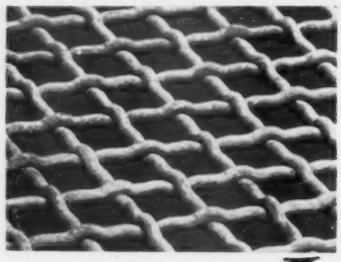

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Less cable overhaul and super-digging power of Williams "Champion" Buckets are features that save crane time and add to your profit per job.

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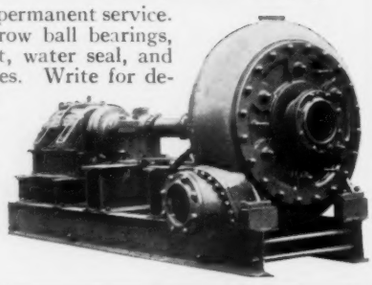
For higher heads and permanent service. Extra heavy double row ball bearings, sleeve protected shaft, water seal, and other exclusive features. Write for details of this and other types of centrifugal pumps.



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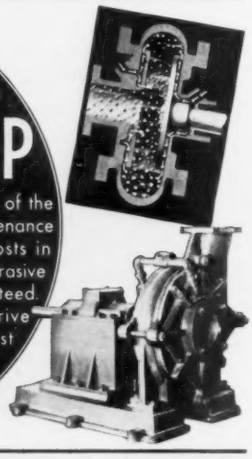

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10x20, 11x36, 24x36 Jaw Crushers.
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12—Crushing Rolls, 16x10, 20x14, 36x16 Sturtevant; 30x10 Colorado Iron Works; 36x16, 42x16 Allis Chalmers; 36x16, 42x16 Traylor.
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1—100 ton Strait Railroad Track Scale.
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The following 440 V Motors: 3—300 HP@720 RPM; 1—200 HP@720 RPM; 1—150 HP@720 RPM; 1—75 HP@1800 RPM; 1—60 HP@1200 RPM; 2—50 HP@720 RPM; 1—50 HP@900 RPM; 1—50 HP@1200 RPM; 2—40 HP@1200 RPM; 1—40 HP@600 RPM; 1—25 HP@720 RPM; 1—15 HP@900 RPM.
6400 ft. 75 lb. rail.
4500 ft. Standard gauge side track, 65 lb. rail, 6—29 70 lb. frogs and switches, guard rails, fittings, etc.
Small equipment, air hoists, and other miscellaneous equipment.

The equipment listed above is being offered subject to prior sale by this company. It consists largely of surplus equipment purchased by the Kansas City Crushed Stone Company at a sale by the Special Master of the assets of the Consumers Material Corporation then in Federal receivership. All of the properties of the Kansas City Crushed Stone Company are now under lease to us and we are offering this equipment on account of the Kansas City Crushed Stone Company. Some items of equipment listed are surplus equipment owned by this company. Some of the equipment has been very little used and is in first class condition. Most of the equipment has been overhauled by us and put in first class operating condition. Full information including prices loaded on cars may be obtained from us.

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1—No. 1030 Good Roads Reduction Crusher.
2—36 by 42 Farrel Jaw Crushers.
1—15 by 36 Farrel Jaw Crusher.
2—13 by 30 Farrel Jaw Crushers.
1—90 HP. Waukesha Motor.
1—20 Ton Bennington Scale.
2—Farrel Revolving Screens.
1—24" Belt Elevator (Farrel make).
1—125 H.P. Motor, Slip Ring.
1—100 H.P. Motor, Slip Ring.
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1—110 cu. ft. Ingersoll Rand Air Compressor.
1—24" by 70' Belt Conveyor.
1—Large Stone Bin.

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Gruendler 3-X-C
Swing Hammer Mill
30" Diameter—30" in Width

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1—No. 5 Austin Crusher.
1—10" Superior McCully Crusher.
1—8" Traylor Crusher.
2—No. 3 Gates Crushers.
1—6" Superior McCully Reduction Crusher.
1—48" Symons Horizontal Disc Crusher.
Several Jaw Crushers.
Gas and Electric Motors, 1 HP to 200 HP.
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2–600	G. E. sl. rg.	252
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600	Al. Ch. syn.	240
3–675	Al. Ch. syn.	900
400	West. sl. rg.	514
400	Al. Ch. syn.	300
300	Al. Ch. sl. rg.	585
260	Al. Ch. syn.	720
250	West. sl. rg.	720
200	G. E. sl. rg.	1200
200	West. sl. rg.	500
200	F. M. sl. rg.	600
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150	G. E. sq. c.	1750
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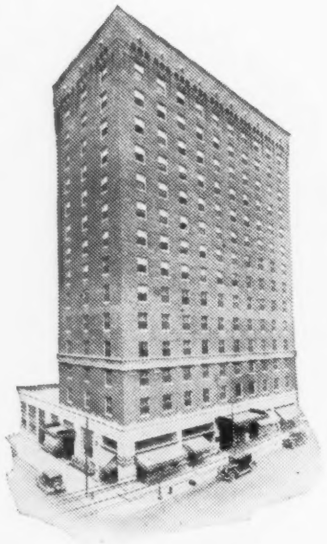

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1—Northwest Type M. Serial No. 2334, 60 ft. boom, 1½ yd. dragline or clamshell bucket.

1—Northwest No. 5, Serial No. 3429, 45 ft. boom, 1¼ yd. bucket.

1—Northwest No. 104 Serial No. 2079, 45 ft. boom; 1¼ yd. bucket.

1—Link-Belt gasoline, Model K-1; 10 ton 50 ft. boom; shop No. K-1024.

1—Erie B-2 steam crane No. 3900; 40 foot boom.

1—Bucyrus-Erie Model 1030, ¾ yd. with 35 ft. boom, new 1931.

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2—Barber-Greene Model 42-A Crawler mounted bucket loaders. Cap. 1¾ yd. per min.

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Gas: 3—12 ton Plymouth 36" gauge, 10—8 ton Vulcan St. Ga., 3—8 ton Plymouth 36" ga., 3—7 ton Whitcomb 36" ga., 3—3 ton Brookville St. Ga.

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2—P & M Roller type, 48" by 18' long.

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1—Link-Belt K-55 Serial No. 1450 crawler mounted Diesel shovel, 30 ft. boom, 18 ft. stick and 2 yd. dipper.

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1—Model "OO" Thew crawler mounted gas shovel. No. 2726, with ½ yd. dipper. Also Link-Belt shovel attachment for Models K-55, K-44, K-42, K-38 or K-2.

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Index to Advertisers

Allen Sherman Hoff Co.....122
*Allis-Chalmers Mfg. Co..... 23
American Manganese Steel Co. 7
*American Steel & Wire Co.. 6
*American Pulverizer Co.....108
Auditorium Hotel 124
Audubon Wire Cloth Corp...122
*Austin-Western Road Machinery Co. 115
Birmingham Rail & Locomotive Co. 127
*Blaw-Knox Co. 1
Bonnot Co. 30
Broadcast Section 123-127
Buffalo Wire Works Co.....121
Burnham, Royal E.....126
Cement Mill Equipment Co.. 31
Chicago Perforating Co.....122
Chicago Steel Fdry. Co.....128
Consolidated Products Co....123
Cross Engr. Co.....
.....Inside Back Cover
*Deister Concentrator Co..... 30
Deister Machine Co.....121
Diamond Iron Works..... 21
*Dixie Mchy. Mfg. Co.....117
*Eagle Iron Works.....120
*Ensign-Bickford Co. 110
Equipment Corporation of America 125
Erie Pump & Engine Works.117
*Fate-Root-Heath Co. 13
Flexible Steel Lacing Co....115
Fuller Co. 15
Gardner-Denver Co. .....
.....Inside Back Cover
Gay, Rubert M.....119
*General Electric Co.....10-11
Good Roads Machy. Corp....122
Goodyear Tire & Rubber Co.. 3
*Gruendler Crusher & Pulv. Co. 16
Haiss Mfg. Co., Geo.....121
*Hardinge Co. 115
Heineken, W. P.....127
*Hendrick Mfg. Co.....119
Hetherington & Berner, Inc..128
*Ingersoll-Rand Co. .....
.....Inside Front Cover
Iron & Steel Products, Inc...127
Jaeger Machine Co..... 25
*Jeffrey Mfg. Co.....111
Kansas City Hay Press Co..122
*Kennedy-Van Saun Mfg. & Engr. Corp. 113
Knickerbocker Co.....108
Koehring Co. 28
Lewis, Harry C.....127
Lewistown Foundry and Machine Co. 121
Lime & Hydrate Plants Co.. 20
*Link-Belt Co. 4-5
Machinery Sales Corp.....123
Mack Trucks, Inc...Back Cover
McLanahan and Stone Corp. 26-27
*Merrick Scale Mfg. Co.....120
*Morris Machine Works.....120
Morrow Mfg. Co.....120
Mott Core Drilling.....126
National Equipment Corp... 28
National Crushed Stone Ass'n 112
National Sand & Gravel Ass'n.112
National Slag Ass'n.....112
National Wire Cloth Co.....117
*Nordberg Mfg. Co.....18-19
Ohio Power Shovel Co..... 22
Pennsylvania Drilling Co...126
Pettibone Mulliken Co..... 8
*Plymouth Locomotive Works. 13
Productive Equipment Corp. 17
Pulmosan Safety Equipment Corp. 121
Raymond Bros. Impact Pulv. Co. 32
*Robins Conveying Belt Co... 9
*Smidth & Co., F. L..... 12
Smith Engr. Works..... 24
Smith Wire & Iron Works, F. P. 120
Sprout, Waldron & Co.....120
Stein-Brill Corp. 127
Stewart Sand & Material Co.123
*Taylor Forge & Pipe Works..117
Technicoal Sales Corp.....
.....Front Cover
*Tyler Co., W. S..... 29
Universal Crusher Co.....120
Universal Road Machy. Co..119
Wellman Engr. Co.....122
*Wickwire Spencer Steel Co.. 14
Williamsport Wire Rope Co..109

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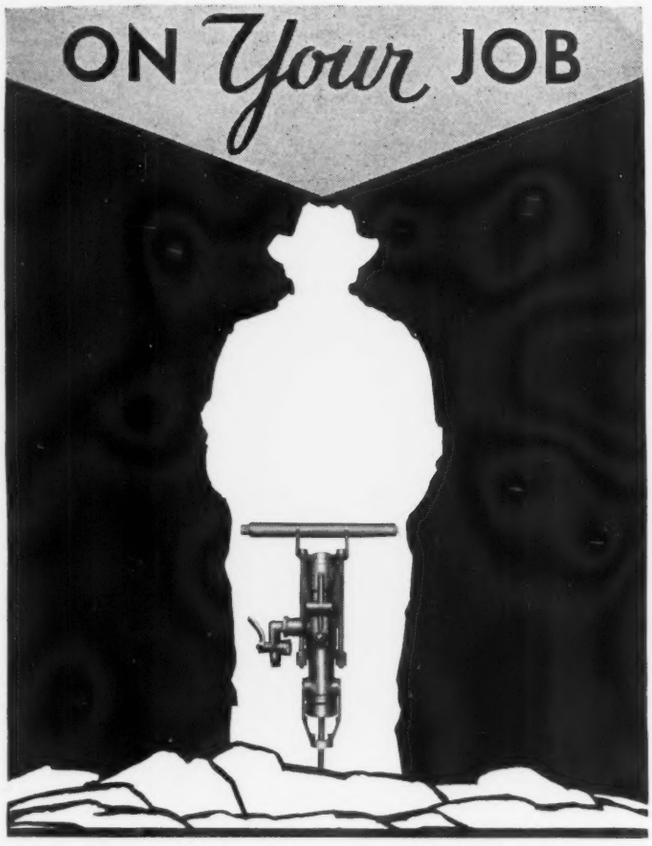

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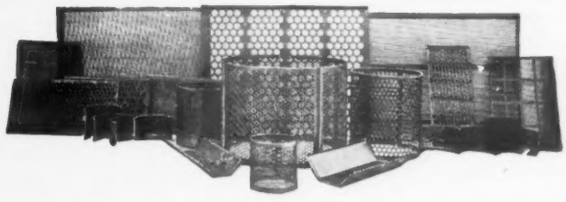

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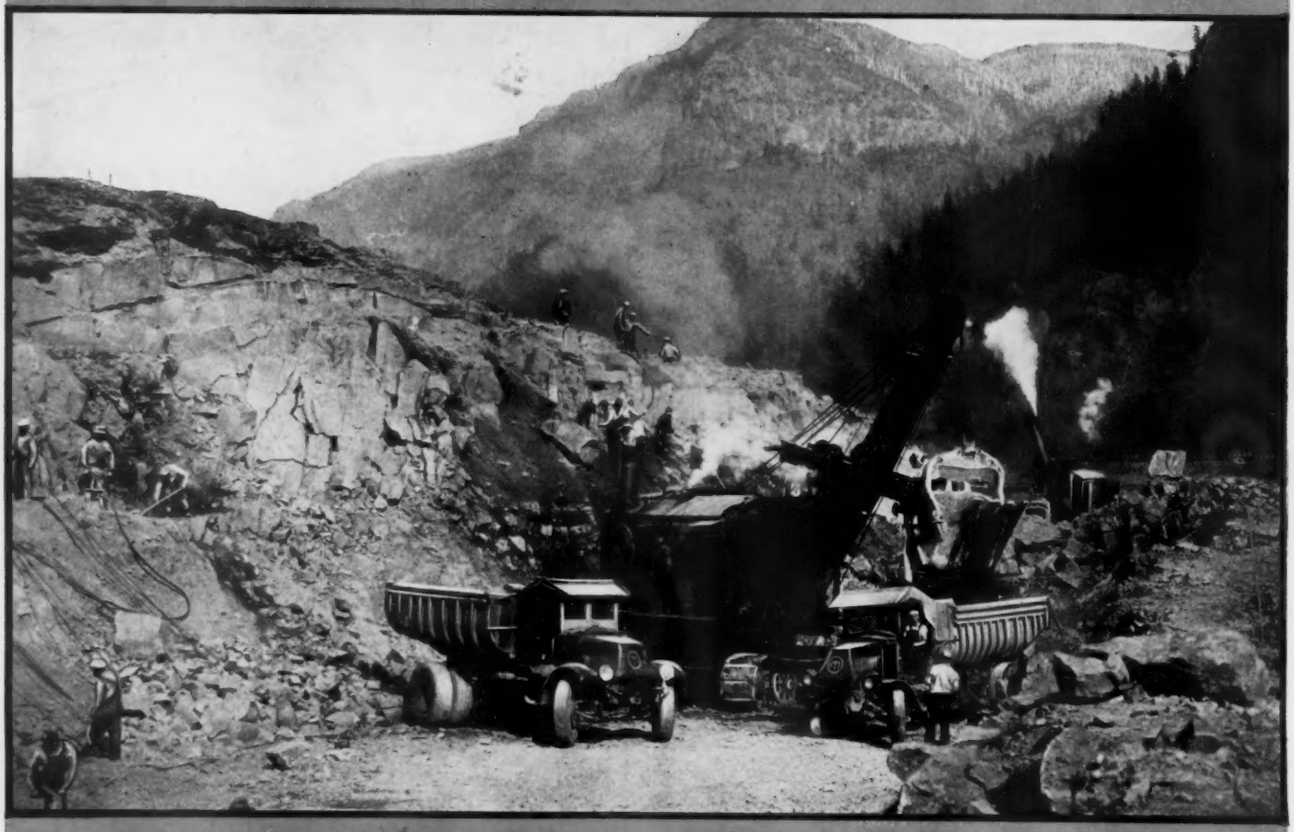

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